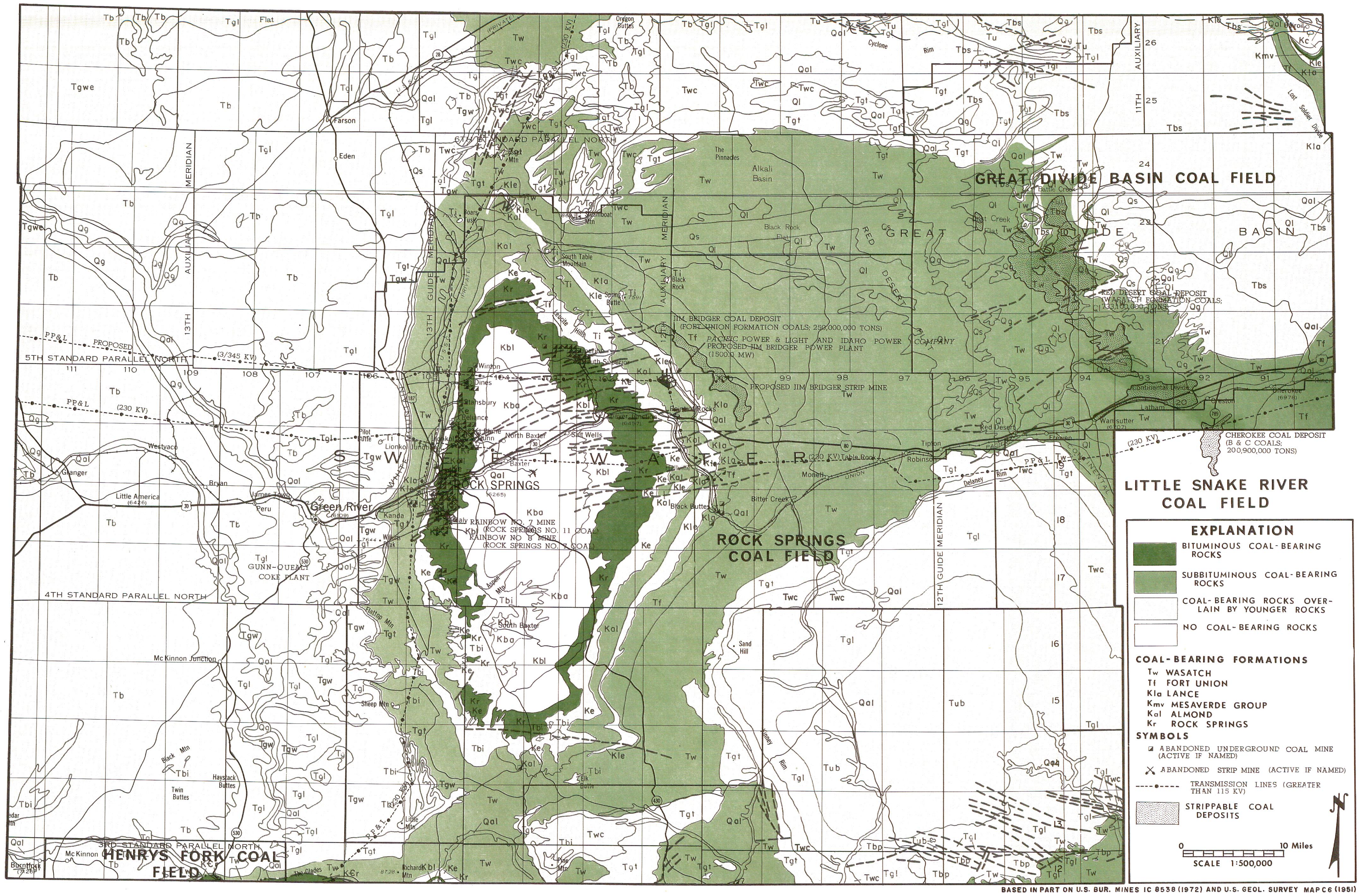
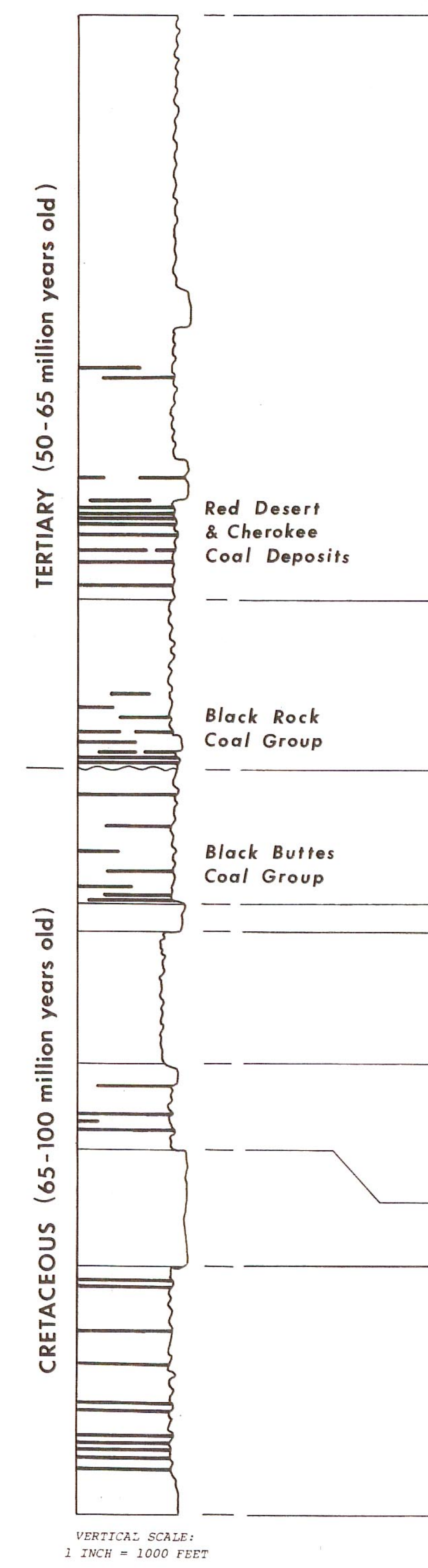


Distribution and Rank of Coal in Sweetwater County



WASATCH FORMATION (3300 ft.)

Although coals occur in the Wasatch Formation around the Rock Springs Uplift, their importance outside the Great Divide Basin coal field is minimal. In the Cherokee and Red Desert deposits of the Great Divide Basin, the basal 700 feet of the Wasatch contains at least 20, lenticular, subbituminous coal seams. At least 7 of the seams range between 5 and 42 feet thick. Additionally, in places, the seams contain up to 0.051% uranium. Because the coals in these deposits are relatively flat-lying (1° - 6° dip), they are potentially strippable over large areas. Partially because of their low Btu value, higher sulfur content (1.2%) and lenticular nature, there has been no significant mining of these seams to date.

FORT UNION FORMATION (1000 ft.)

Subbituminous Fort Union coals are locally known as the Black Rock coal group. Although they crop out on both sides of the Rock Springs Uplift, they are best developed on the east side where they were occasionally mined underground in the early 1900's. While seams dip 5-6° on the east side, they steepen to more than 7° on the west side. A maximum seam thickness of 30 feet occurs in the Jim Bridger deposit, which will soon be surface mined.

LANCE FORMATION (750 ft.)

Subbituminous coals of the Lance Formation are known as the Black Buttes coal group. Where they crop out on the northeastern and eastern sides of the Rock Springs Uplift, several small underground mines worked 4-9.6 foot thick coals in the early 1900's. Because the coals only dip 5-6°, they exhibit some strippable potential. Lance coals are relatively unimportant in Sweetwater County.

FOX HILLS SANDSTONE (No coals)

LEWIS SHALE (No coals)

ALMOND FORMATION (500 ft.)

Subbituminous coals in the Almond Formation crop out on all but the southwestern side of the Rock Springs Uplift. Small abandoned underground mines on 4-8.5 foot thick seams are located near Point of Rocks and Rock Springs. The Almond coals are relatively unimportant in Sweetwater County.

ERICKSON SANDSTONE (No coals)

ROCK SPRINGS FORMATION (1400 ft.)

Bituminous coals mined from the Rock Springs Formation account for more than 44% of Wyoming's total coal production to date. One of as many as 10 mineable seams is still mined underground. This mined seam is 4-5 feet thick. In the past, mined coals occasionally exceeded 13 feet in thickness, and averaged 6-8 feet. The thickest and most persistent coals occur in the northern part of the field between Quealy, Winton, and Superior. While the coals dip 4-5° at Superior, their average dip is 6-12° at Rock Springs. Surface mining accounts for little production to date, but potentially strippable coals remain.

The formation thicknesses, which are in parentheses, represent the average formation thicknesses where they are coal-bearing.

Stratigraphic Column of Coal-Bearing Rocks in Sweetwater County

Coal and Coal Mining

Fifty million to 100 million years ago lushly vegetated swamps frequently grew on the shorelines of ancient seas that periodically advanced and retreated over what is now Sweetwater County. Coal seams, which are the fossilized carbonaceous remnants of plant life that inhabited those swamps, are common in the stratified rocks that formed during those ancient times. According to the best available data, 11% of Wyoming's remaining coal resources and 7% of its strippable coals are in Sweetwater County. Although these coal-bearing rocks underlie 96% of the county, some at great depths, coal at or near the surface is limited to 45% of that area. Where these rocks are not exposed they are concealed by younger and overlying, noncoal-bearing rocks. Less than 4% of Sweetwater County contains no coal-bearing rocks whatsoever.

Commercial coal mining in Sweetwater County began in 1868 as the Wyoming portion of the Union Pacific Railroad was completed. Record annual production exceeded 6 million tons in 1945. Unfortunately, the county's coal market collapsed when railroads converted to diesel engines in the 1950's. By 1956, Sweetwater County, which had always been the State's largest coal producer, was reduced to one of the smallest. In 1972 it contributed less than 5% of the State's annual production or less than 500,000 tons. Despite this decline, more coal has been mined from Sweetwater County than any other county in the State. The county's total production is 201 million tons, of which strip mining accounts for only 1.2 million.

The current decline in production will soon end as strip mining becomes the dominant mining method. After completion of the State's largest coal-fired power plant, Pacific Power & Light and Idaho Power's Jim Bridger Plant near Point-of-Rocks, annual production should top 6 million tons again by 1976 or 1977. Most of this tonnage will come from the anticipated 5.5 million ton per year strip mine, which will fuel the power plant. Another tradition will also be shattered when that mine opens. Heretofore, 99% of the coal mined in the county was bituminous coal from the Rock Springs Formation. The Jim Bridger operation will strip mine subbituminous coal from the Fort Union Formation, instead.

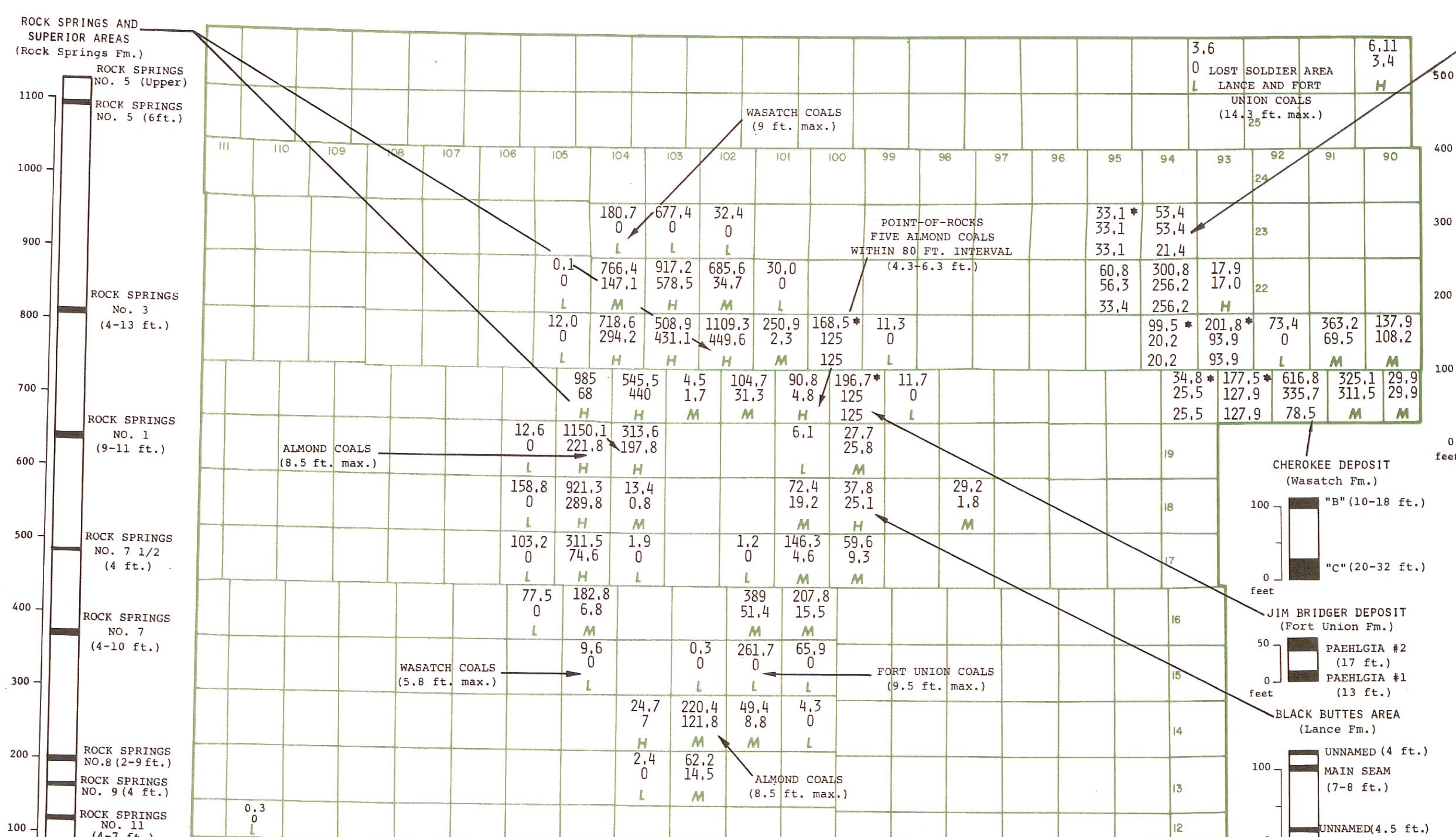
Coal Resources

Sweetwater County has more than 15.2 billion tons of mapped and explored coal between 0 and 3000 feet below the land surface. Although it is generally conceded that approximately one-half of that resource figure is recoverable, a more meaningful resource is the 5 billion tons of coal under 0 to 1000 feet of cover. It is within this range that both current underground mining and strip mining are concerned. In the former case, new underground coal mines are generally designed to a maximum depth of 1000 feet and quite often much less than that. The minimum seam thickness in deep mines is about 42 inches.

In areas where the cover is less than 100 feet thick, underground mining is extremely inefficient and hazardous; therefore, this shallower coal is best recovered by strip mining methods. Today, strippable coal resources are usually limited to coals under less than 200 feet of rock. Although there is no minimum thickness for a strippable seam, subbituminous coals less than 5 feet thick and bituminous coals less than 28 inches are not included in strippable resource estimates. Known strippable resources of 1,151,065,517 tons (Smith, 1972) underlie approximately 92 square miles or nearly 59,000 acres of Sweetwater County. This is about 0.8% of the county's total area.

The map to the right, which is based on U.S. Geological Survey estimates of original resources (Berryhill, 1950), shows township by township estimates of the coal resources between 0-3000 feet of cover, 0-1000 feet of cover as well as the U.S. Bureau of Mines strippable resource figures. Townships for which there are no strippable resource estimates are annotated to reflect the probability of their containing strippable coals. These probability estimates are ranked as high (H), moderate (M), and low (L). Coal reserves, which must be based on such factors as transportation and mining costs, are not included for any category.

For more detailed information on the coal and coal resources of Sweetwater County, refer to the green reference list to the right.



ORIGINAL RESOURCES 0-3000 FT. BELOW SURFACE (BITUMINOUS COALS > 14 INCHES AND SUBBITUMINOUS COALS > 2.5 FT. THICK)[1] — 34.8

ORIGINAL RESOURCES 0-1000 FT. BELOW SURFACE (BITUMINOUS COALS > 28 INCHES AND SUBBITUMINOUS COALS > 5 FT. THICK)[1] — 25.5

* ORIGINAL RESOURCES REVISED SINCE U.S. GEOL. SURVEY CIRCULAR 81 IN 1950

25.5 — STRIPPABLE RESOURCE ESTIMATE[1] BY U.S. BUREAU OF MINES

(H, M, AND L, RESPECTIVELY, DESIGNATE HIGH, MODERATE AND LOW PROBABILITIES FOR STRIPPABLE COALS OCCURRING IN TOWNSHIPS WHERE THERE ARE KNOWN COAL RESOURCES BUT NO U.S. BUREAU OF MINES STRIPPABLE ESTIMATES)

[1]Resource figures in millions of tons

REMAINING ORIGINAL RESOURCE THROUGH 1971 (0-3000 FT. DEEP) = 15,268,312,704 TONS

REMAINING ORIGINAL RESOURCE THROUGH 1971 (0-1000 FT. DEEP) = 5,170,282,704 TONS

REMAINING STRIPPABLE RESOURCE THROUGH 1971 (0-200 FT. DEEP) = 1,061,600,000 TONS

REMAINING RECOVERABLE RESOURCE THROUGH 1971 (0-3000 FT. DEEP) = 8,101,314,845 TONS

Coal Resources and Seam Thicknesses

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GALE, H. S., 1909, Coal fields of northwestern Colorado and northeastern Utah: U.S. Geol. Survey Bull. 341, p. 283-315.

MASURSKY, H., 1962, Uranium-bearing coal in the eastern part of the Red Desert area: U.S. Geol. Survey Bull. 1099-B, 152 p.

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Today, Gunn-Quealy Coal Company operates the only active coal mine in the county. Their Rainbow No. 8 mine, which is located south of Rock Springs (Sec. 23, T18N, R105W), produces approximately 100,000 tons annually. All the coal is used in Gunn-Quealy's unique rotary-hearth coke plant that converts the weakly coking, bituminous coal into a chemical grade coke, suitable for reducing phosphate ore in electric furnaces.

	AVERAGE AS-RECEIVED ANALYSIS	ROCK SPRINGS FM. COALS: ROCK SPRINGS & SUPERIOR	ROCK SPRINGS FM. COALS: ACTIVE MINES	ALMOND FM. COALS	LANCE FM. COALS	FT. UNION FM. COALS: JIM BRIDGER DEPOSIT	FT. UNION FM. COALS: OTHER DEPOSITS	WASATCH FM. COALS: UPLIFT AREA	WASATCH FM. COALS: CHEROKEE DEPOSIT	WASATCH FM. COALS: RED DESERT DEPOSIT
PROXIMATE	MOISTURE (%)	13.2	8.0	16.4	17.5	17.0	16.6	19.3	20.0	21.9
PROXIMATE	VOLATILE MATTER (%)	33.8	38.7	31.0	29.8		33.7	33.0	32.0	32.5
PROXIMATE	FIXED CARBON (%)	48.7	48.8	47.7	48.6		43.0	40.4	34.0	35.0
PROXIMATE	ASH (%)	4.3	4.6	5.0	4.1	10.0	6.6	7.2	14.0	10.6
ULTIMATE	SULFUR (%)	0.9	0.7	0.6	0.4	0.7	0.6	1.5	2.8	2.2
ULTIMATE	HYDROGEN (%)	5.7		5.4	5.7		5.5	5.6		6.2
ULTIMATE	CARBON (%)	63.6		58.1	58.2		55.9	53.2		49.1
ULTIMATE	NITROGEN (%)	1.2		1.2	1.4		1.2	1.1		1.0
ULTIMATE	OXYGEN (%)	24.2		29.7	30.3		30.2	31.3		30.9
	HEAT VALUE (Btu/lb.)	11,402	12,463	9727	10,110	9700	9540	8770	7004	8680

Based on analyses published by the U.S. Geological Survey and U.S. Bureau of Mines as well as company records.

Average Coal Analyses

Engineering Characteristics of Surface Geologic Materials

The traditional geologic map shows the areal distribution of individual rock units called formations. A formation is a body or layer of rock sufficiently homogeneous in composition or physical character to be traceable and mappable over a large geographic area. Application of the data presented on conventional geologic maps to problems related to human activities will be difficult for the non-geologist, who is usually unfamiliar with the characteristics of the formations whose outcrop distribution he sees displayed.

Regrouping and remapping of conventional formations in units based solely on physical characteristics is the most direct method of making geological information readily available for application to engineering, environmental, and planning problems.

On the accompanying map, the outcropping geological formations have been divided into seven new categories based on their suitability for particular uses. The characteristic topography, the foundation and slope stability characteristics, the ease of excavation and compaction, the permeability as it relates to sewage and solid waste disposal, and the presence of valuable ground water or mineral resources are all factors which must be considered in developing an engineering and environmental geologic map.

At the present scale of mapping, much lumping of small units has been done, particularly in the areas indicated as Tertiary mudstones, siltstones, sandstones, marlstones, limestones, tuffs, and oil shales. The principal purpose of this map is to inform the layman of the widely varying suitabilities of the geologic materials on the surface of Sweetwater County for different human activities, and to advise him as to what geology-related problems might be encountered in a particular area. Detailed investigations of individual construction sites or home development areas would, of course, be required to determine the presence or seriousness of these problems in any one locality.

RECENT ALLUVIUM AND LACUSTRINE DEPOSITS

In Sweetwater County, unconsolidated materials deposited by present-day streams or in fresh to brackish playa lakes underlie flat surfaces along or adjacent to major streams, and broad flat surfaces in areas of closed drainage. Alluvium in the stream valleys is material derived from the erosion of nearby bedrock and is composed dominantly of sand, with admixtures of silt, clay, and gravel. The coarsest alluvial deposits are in the valley of the Green River. Alluvial deposits along the Green probably range up to 50' in thickness. Lesser thicknesses are found along the smaller streams. Alluvial material is easily excavated and compacted. Suitability for foundation construction is dependent on local content and distribution of clay within the alluvium, but alluvial material generally provides a satisfactory base for most construction. Alluvial sands and gravels have high to moderate permeability and are among the best sources of ground water of good to fair quality in the county. The high permeability of these zones and the resulting potential for contamination of ground and surface water would limit the satisfactory use of these areas for sanitary landfill or massive septic tank development. Virtually all irrigated farmlands in Sweetwater County lie on deposits of Recent alluvium.

Sediments of the lacustrine flats are generally silty clays. Such sediments are generally saline because of the closed drainage and arid climatic conditions under which they were deposited. The Recent lacustrine sediments can be unstable as a base for construction, due to a high content of swelling clay. The salinity and low permeability of these sediments make their ground water potential very low. They would likewise be poorly suited for septic tank development.

QUATERNARY DUNE SANDS

Unconsolidated sands and silts deposited by the wind are present in Sweetwater County primarily in a 60-mile long belt extending east-west across the north end of the Rock Springs Uplift and east into the Great Divide Basin. The dune sands form a hummocky topography with numerous closed depressions. The sand dunes are both active (presently migrating) and inactive (stabilized by partial plant cover). Most of the sand dunes are too thin to contain much water, but serve as excellent recharge areas for underlying formations. The dune sands are non-plastic and may be a potential source of construction materials.

VOLCANIC ROCKS

The lava flows and volcanic cones of the Leucite Hills form a high plateau area due to the hard, resistant character of the flat sheets of flow-rock. Blasting would probably be required for major construction in these areas. Low permeabilities characterize these materials, and little ground water potential exists in these areas. These rocks are the hardest in Sweetwater County and could be utilized for crushed aggregate. Pumice in the volcanic cones on the mesas can be used for lighweight aggregate in concrete and as a decorative building stone.

TERTIARY CONGLOMERATES AND TUFFACEOUS SANDSTONES

In the southern part of Sweetwater County, isolated patches of the Bishop Conglomerate and the Browns Park Formation underlie topographically high, table-like areas. These formations are moderately to poorly cemented, composed of poorly sorted, fine-grained gravels and boulders in a tuffaceous sandstone matrix or groundmass, or of white, soft, tuffaceous sandstone. These materials are easily excavated using conventional dozing equipment. They are of moderate permeability, and the high areas which they underlie are well drained. The groundwater potential of these materials is not well known, but should be fair to good. The Bishop Conglomerate could be a major source of highway construction material. Stability of slopes or cuts is dependent on local clay and volcanic ash content, but these materials frequently form natural ledges or cap rocks indicating a high degree of stability.

TERTIARY MUDSTONES, SILTSTONES, SANDSTONES, MARLSTONES, LIMESTONES, TUFFS, AND OIL SHALES

The major part of the rolling topography of Sweetwater County is underlain by a mixed sequence of moderately to poorly consolidated rocks of fluvial, paludal and lacustrine origins. Bluffs or palisades are formed by the more resistant sandstone, oil shale, tuff, marlstone, and limestone units within the sequence. The majority of the units can be excavated using conventional bulldozing equipment, but some of the limestones and sandstones may require ripper equipment. Problems of slope stability can be encountered in mudstone and siltstone units, as montmorillonite (a swelling clay) forms a high percentage of the clay minerals present in these rocks. Very low to moderate permeabilities are the rule in these rocks, depending mainly on the amount of clay present locally. Areas of fair to moderate permeability (those underlain by siltstones and sandstones) should be very suitable for waste disposal by septic tank systems and also for sanitary landfill sites. Little chance exists in such rocks for contamination of ground or surface waters. In areas of low permeability (mudstones) septic systems may be unsatisfactory due to low percolation rates; however, the easily excavated mudstones would be most favorable for sanitary land fills.

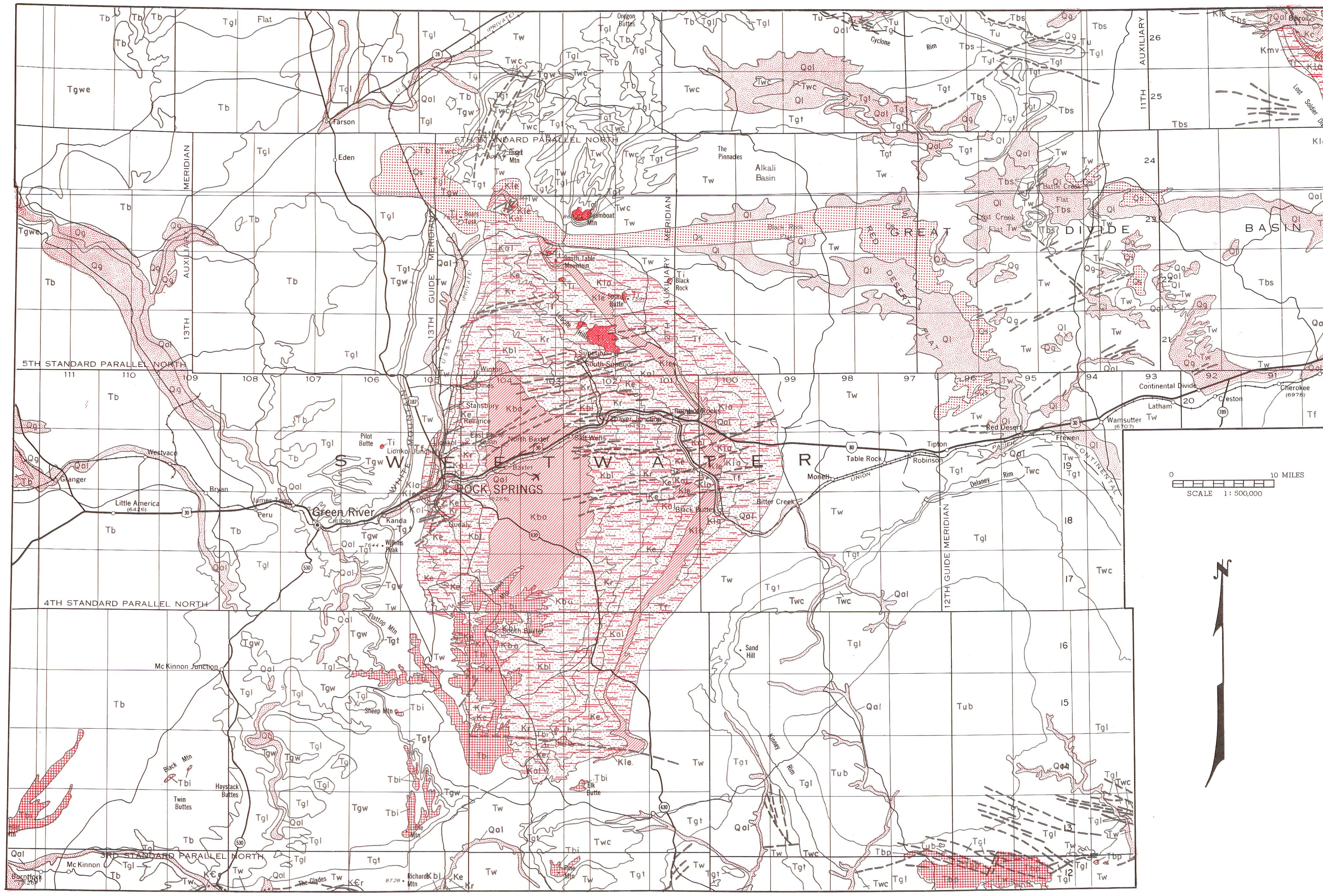
These rocks contain much of the potential mineral wealth of Sweetwater County in the form of trona, coal, and oil shale. Construction materials resources are not generally found in these rocks. Some of the thin, more resistant limestone layers might be utilized as crushed aggregate.

CRETACEOUS AND LOWER TERTIARY SANDSTONES

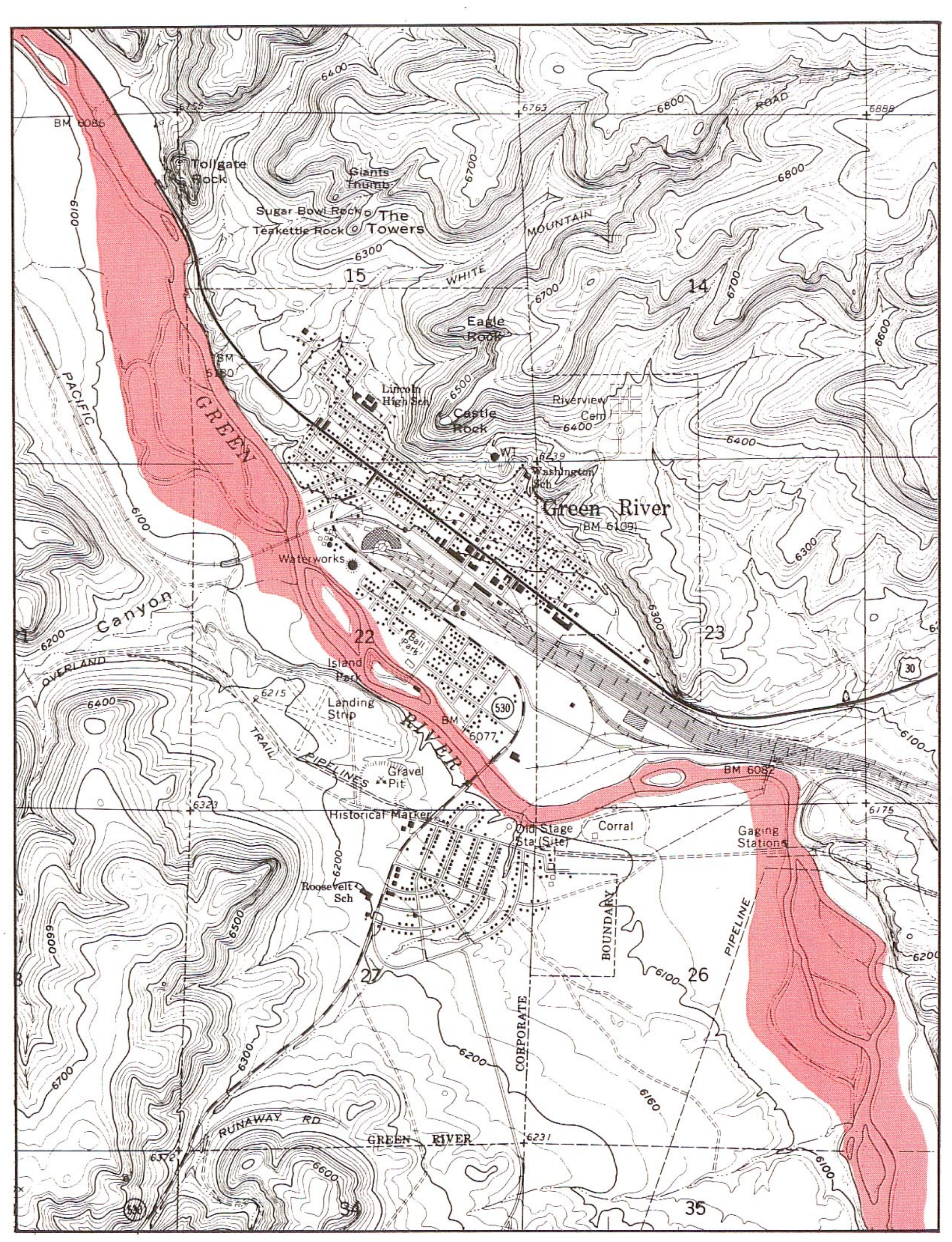
Some of the hardest and most erosion-resistant rocks in Sweetwater County are the fluvial and near-shore marine sandstones of Lower Tertiary and Cretaceous age. Interbedded and interfingering with the dominant sandstone layers are silty shales, coals, and carbonaceous shales. These sandstones are moderately to strongly consolidated and form the striking hogbacks or cuestas around the Rock Springs Uplift. Blasting is sometimes necessary for excavation of the better cemented layers in these rocks. Stability in the massive sandstone units is generally good, but some interbedded silty and sandy shales within these sequences tend to erode quickly on steep cuts and undercut overlying sandstones. Some thin carbonaceous shales and coals are present in these units. These units will generaly weather more rapidly than the sandstones overlying, causing rockfalls in steep cuts. Soils are thin and stony on most of these units. Permeability is good to moderate, and the rocks provide one of the better sources of ground-water in the county. Ground-water quality is lessened by the presence of coal or carbonaceous layers; potential for contamination of ground-water should be considered before high density use of septic tank systems or sanitary land fill development is undertaken in these areas.

CRETACEOUS MARINE SHALES

Marine shales of Cretaceous age are exposed in the center and on the limbs of the Rock Springs Uplift. These gray to black, soft shales characteristically underlie nearly flat to gently rolling areas lower than the hogback ridges formed on the Cretaceous sandstone units. The shales are soft and easily excavated. As the clay in these shales is dominantly montmorillonite (a swelling clay), foundation and slope stabilities will be a problem in some parts of the formations. Thorough investigations of swelling and stability characteristics should be made before major construction projects are begun on these materials. Because of the swelling clay content, these shales are very impermeable to water. Consequently, runoff is rapid, although water trapped in shallow depressions may stand for long periods, causing drainage problems. The marine shales are highly saline in character. Ground or surface water which comes in contact with these beds tends to become highly saline. Because of the tight, impermeable nature of the beds, little ground-water can be expected. Low permeability makes these units generally poorly suited for high density septic tank disposal systems. Individual silty zones within the sequence should be adequate, however, for low density use. Sanitary land fill facilities could be located within these easily excavated materials with little danger of ground-water contamination.



Floods in the Green River Area



Areas inundated during flood of May-June, 1972

SCALE 0 .5 1 Mile

The natural flow of the Green River as it passes by the town of Green River has been partially regulated by Fontenelle Reservoir since August of 1963. Before Fontenelle Reservoir was constructed, the maximum flow ever observed at Green River was 22,200 cubic feet per second, recorded on June 19, 1918. No records are available on the extent of the flooding which accompanied that peak flow. However, the regulating effect of Fontenelle Reservoir strongly decreases the likelihood that flows of this magnitude will be experienced again.

The maximum flow experienced after the construction of Fontenelle Reservoir occurred in early September of 1965 and was due to the emergency release of water from the reservoir. The flow at that time reached a peak of 16,800 cubic feet per second. Peak flows of around 15,000 cubic feet per second observed in late May and early June of 1972 produced floods in the areas designated on the accompanying map. Periodic repetition of floods of at least this magnitude should be expected, and care should be taken to prevent the development of residential areas, sewage treatment facilities, and sanitary landfill sites in areas subject to flooding.

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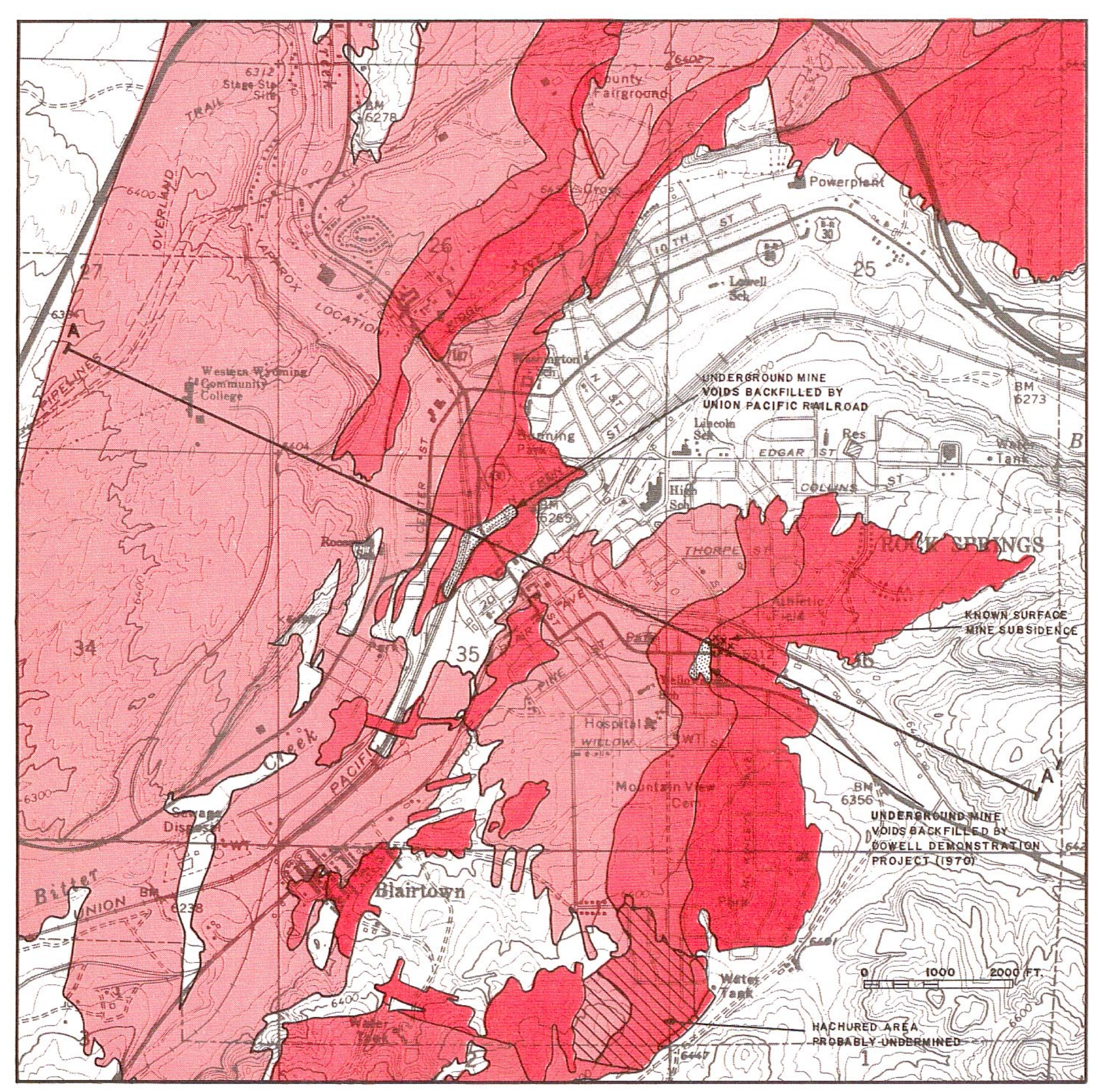
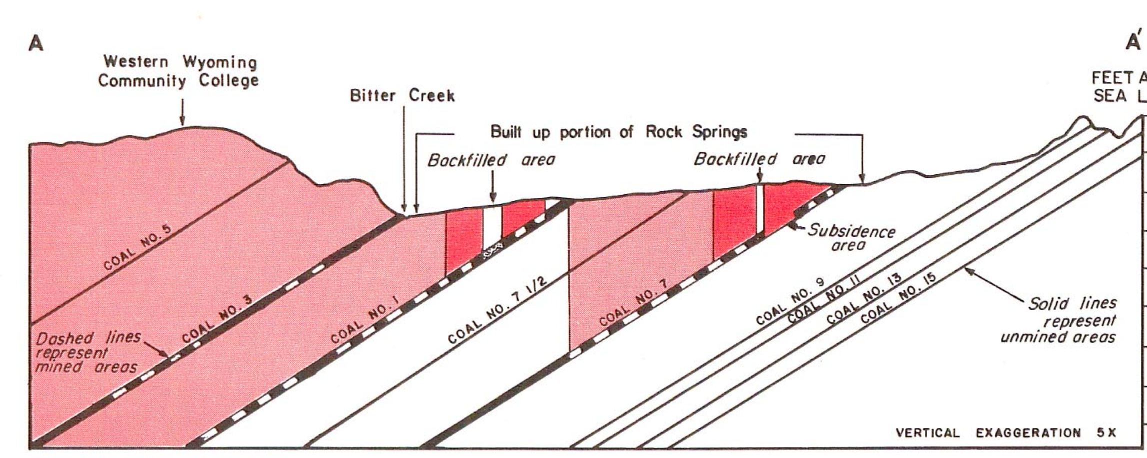
Map made with data supplied by the U.S. Army Corps of Engineers, Sacramento District.





CROSS SECTION A-A'

LESS THAN 120 FEET OF ROCK AND SOIL BETWEEN LAND SURFACE AND UNDERLYING COAL MINE

120-180 FEET OF ROCK AND SOIL BETWEEN LAND SURFACE AND UNDERLYING COAL MINE

GREATER THAN 180 FEET OF ROCK AND SOIL BETWEEN LAND SURFACE AND UNDERLYING COAL MINE

LAND SURFACE NOT UNDERLAIN BY COAL MINES

As evidenced by the adjacent map and cross section, 80% of the City of Rock Springs is undermined by coal mines. In some areas, mines on two or even three seams overlie one other. Only 13-20% of this undermined area, however, is considered highly susceptible to mine subsidence damage. Because the potential for subsidence depends on the type of underground mining, the depth of the mine, the thickness of the seam mined and the character of the overlying rocks, no totally reliable predictions can be made as to where, when, or how extensive the damage might be. However, based on where damage has already occurred in Rock Springs, pillar mined areas less than 120 feet beneath the surface pose the greatest potential threat. Structural damage to buildings and broken utility lines and pipes are already reality in two acres of such an area in the southeastern part of the City.

Since subsidence damage has not been reported in areas where mines are greater than 120 feet below the surface, breakage caused by cave-ins at greater depths probably has not materially affected the surface. Where pillars were pulled during the mining process, major subsidence is already complete. Cracks and small open voids still occur above these areas as well as above the deeper mines. Water moving down along these cracks and into the voids will carry soil with it and could minimally result in accelerated deterioration of streets and sidewalks. Although this type of subsidence is unlikely to cause structural damage, it will take its toll in surface maintenance demands.

Backfilling underground mines is the most universal abatement procedure that can be implemented without destruction or removal of existing surface facilities. In 1970, a small backfilling demonstration was conducted in Rock Springs. A rock slurry, pumped through vertical boreholes, filled a portion of an abandoned mine to prevent future collapse of the mine roof in that area. Based on that demonstration, a full scale backfilling project is expected to cost a minimum of $16,000 per acre. In 1972, Rock Springs received a federal grant of $800,000, which, in part, will be used to backfill about 24 acres of land in 1973.

Although backfilling alleviates the more serious dangers to life and property, it does not eliminate potential damages related to cracks and small voids. Additionally, this procedure will not work satisfactorily in areas which have already subsided.

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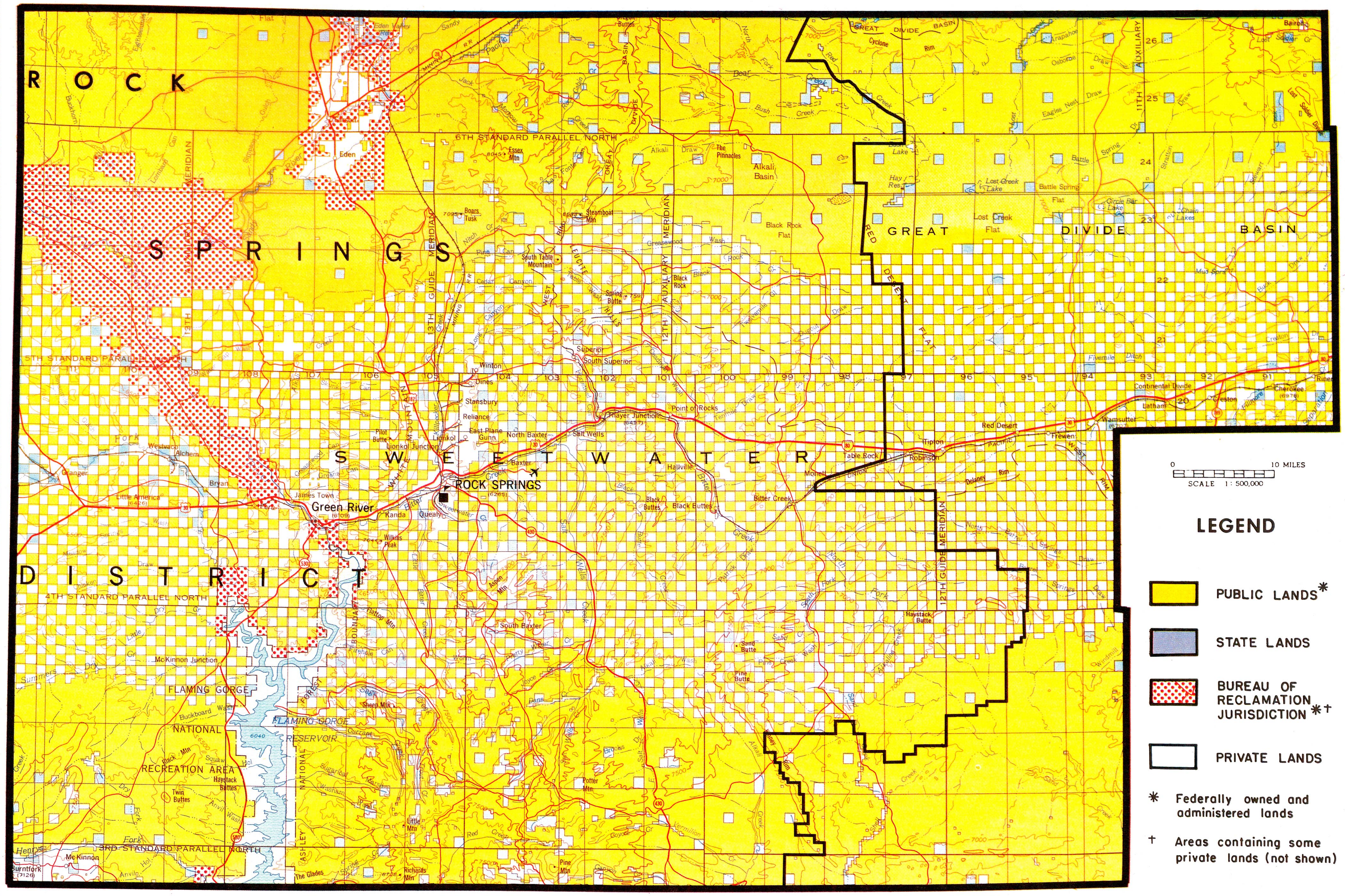
Relationship of Surface Subsidence to Underground Coal Mines Beneath Rock Springs

WYOMING GEOLOGICAL SURVEY, 1973



Reproduced from Land Status Map, State of Wyoming, U.S. Bureau of Land Management, 1967

Land Ownership in Sweetwater County

Land Ownership and Mineral Revenue

Originally, all of the land and mineral ownership of Sweetwater County was in the public domain acquired by the United States under the Louisiana Purchase (1803), or from the State of Texas (1845). Since then, some of the land has passed into private ownership as the result of the Homestead Act. Other public domain lands were conveyed to the Union Pacific Railroad in 1862, and certain "school lands" were conveyed to the State by the federal government at the time of Statehood or acquired in other ways.

A tabulation of Sweetwater County's surface ownership in 1964 showed that the Federal government owned about 68%, 27% was in private ownership, and State and local governments held about 5%. An estimate of corresponding mineral ownership shows that about 70% was federally owned, 27% was private (or fee) ownership and about 3% was State owned. These figures clearly illustrate the dominant ownership and, hence, the control of mineral resource development in the county.

Mineral leases differ from tract to tract. Some leased rights include the opportunity to drill and explore for oil and gas, some are just for coal, others are for trona, clay, uranium or even sand and gravel. As new economic mineral deposits are discovered new arrangements are worked out with the lessor for exploitation and development.

Of the minerals produced in the county, oil had the highest assessed valuation for tax purposes in 1972 at $27,206,993, trona was second at $14,616,185, natural gas was assessed at $9,560,857, and coal production at $1,261,982. Assessed values are determined on the basis of the previous year's production.

FUTURE MINERAL DEVELOPMENT POTENTIAL

Because of its unique geologic setting, Sweetwater County is especially well endowed with a variety of valuable mineral resources. Oil and gas development can be expected to attract considerable attention for at least another decade. As new discoveries are made the incentive will become stronger to test more remote areas and deeper horizons. The vast oil shale deposits in the Green River and Washakie Basins are well enough known to warrant development interest. The Department of Interior is expected to announce its decisions regarding the availability of oil shale leases in 1973. Development of oil shale depends on these decisions as well as current extraction and marketing economics.

To date, there has been very little uranium production in the county; however, as illustrated on other sheets in this series, commercial grade uranium ore has been found in the Great Divide Basin. Uranium mining operations will probably be established within the next few years.

Several new surface coal mining operations can be anticipated in the county in the near future, along with continued rapid expansion of operations for the underground mining of trona north of Green River. As the population increases and the need for construction materials grows, demand for sand, gravel, rock aggregate and clay will increase. The availability of construction materials will critically influence the county's development.

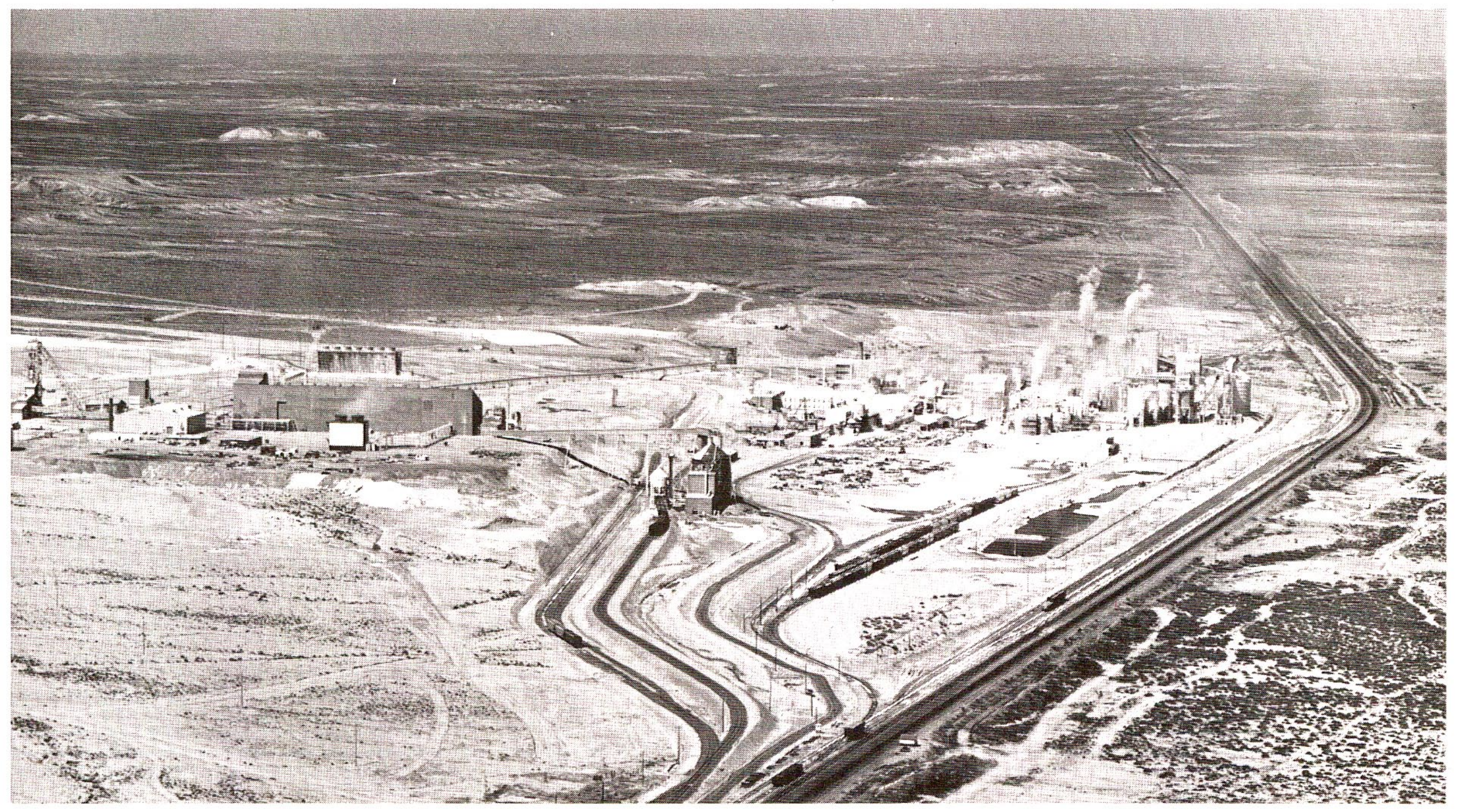
NEW OIL AND GAS
DISCOVERY IN 1972:

Brady Field Discovery Well
Champlin Petroleum,
Mountain Fuel Supply Company,
and AMOCO
Sweetwater County
T16N, R101W

National attention was attracted to Sweetwater County in December 1972 when Champlin Petroleum - Mountain Fuel Supply Company -AMOCO drilled the No. 1 Brady Unit on the southeast flank of the Rock Springs Uplift and found multiple pay horizons of oil and gas. The most significant pay zone is the Pennsylvanian Weber Formation, which is more than 13,600 feet below the surface.

Sweetwater County oil and gas had an assessed valuation of $36,767,850 in 1972. $27,206,993 was from oil and $9,560,857 from gas.

Photo courtesy of the Mountain Fuel Supply Company, Salt Lake City, Utah.



WORLD'S LARGEST SODA ASH PLANT:

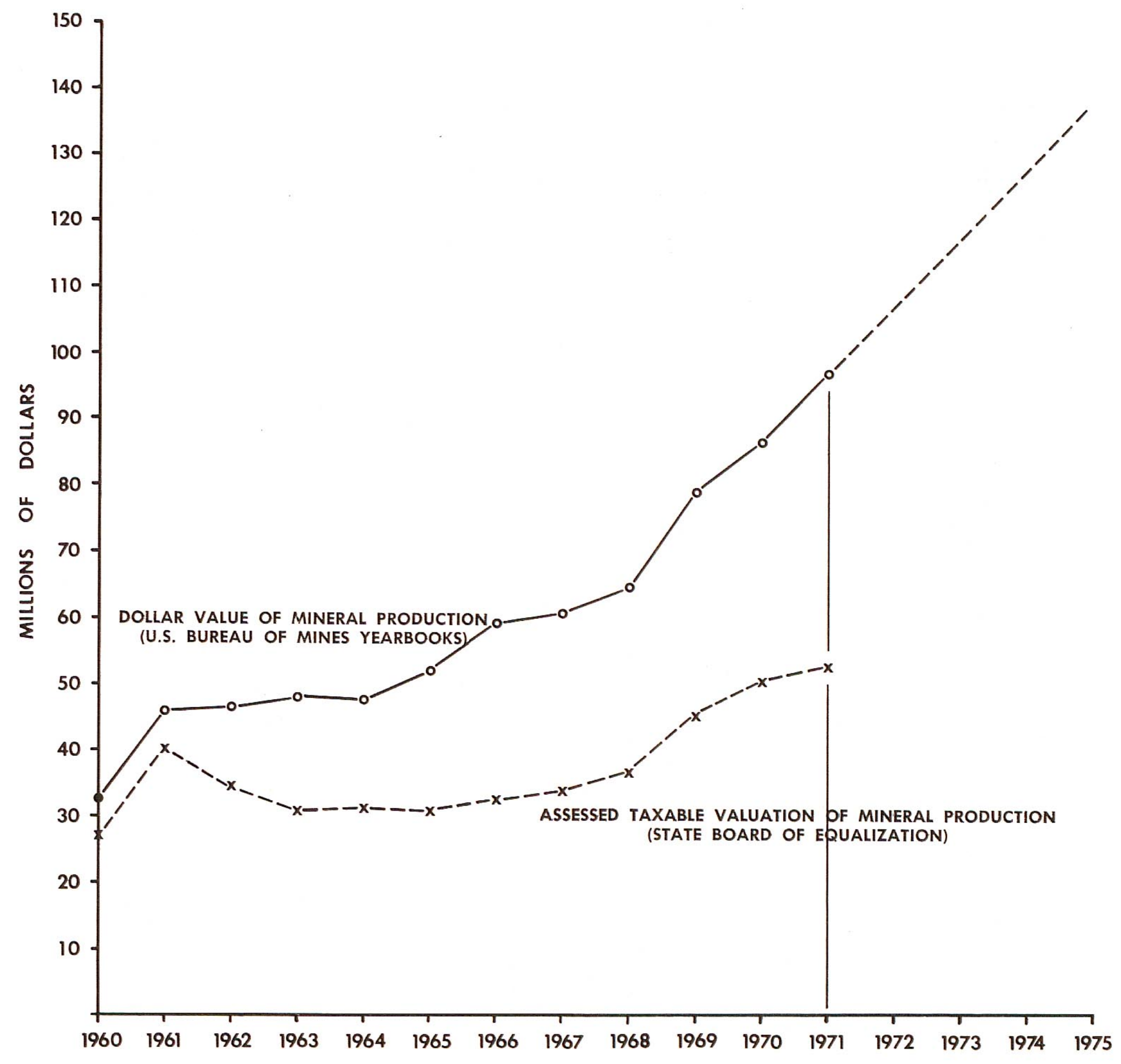
FMC Corporation
Industrial Chemicals Division
Green River, Wyoming

This operation requires more than 3 million tons of Wyoming's trona ore to produce 1.75 million tons of soda ash per year. The flat bedded trona deposit is mined 1500 feet beneath the surface.

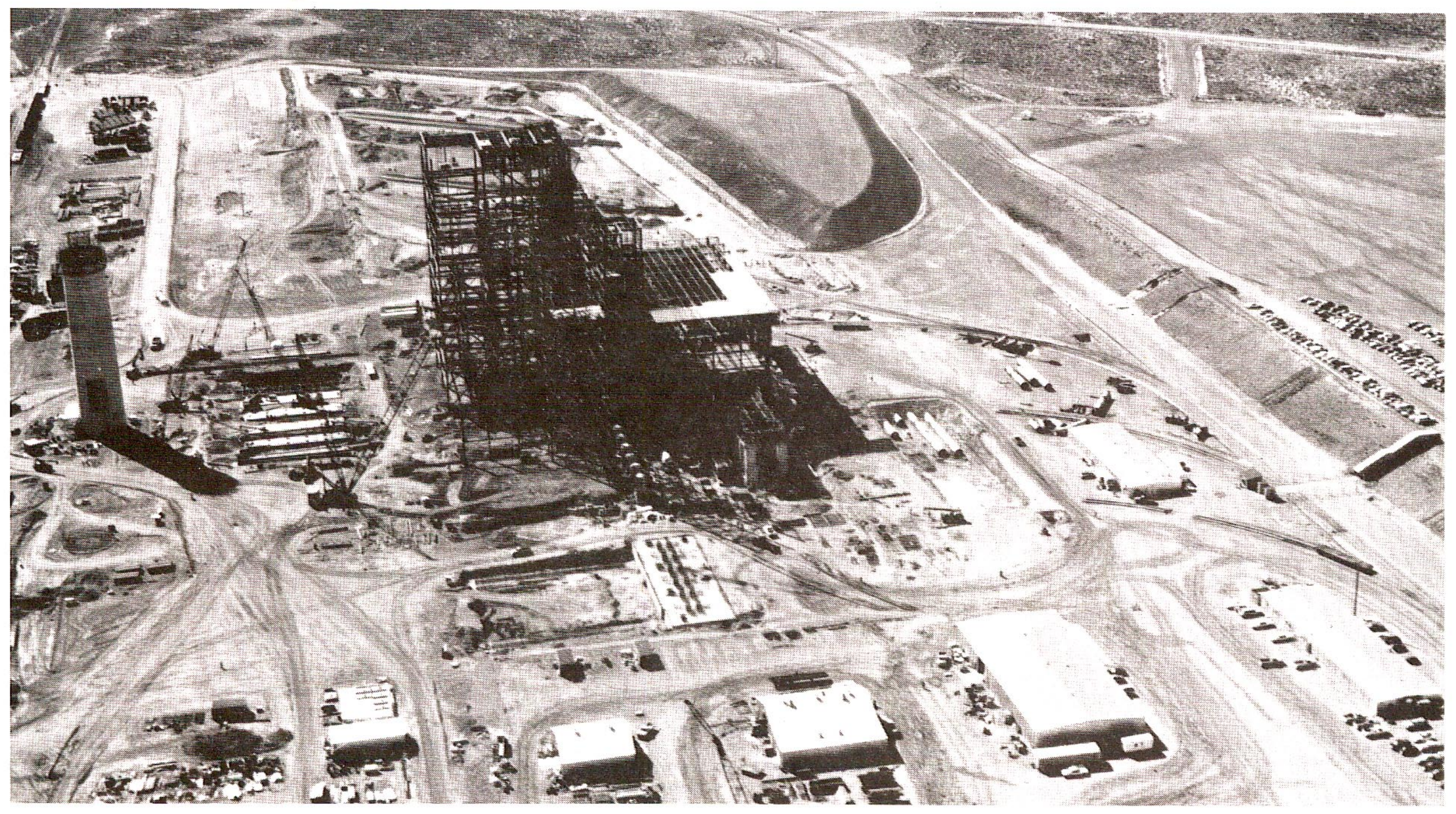
At the left is the newest chemical process addition, completed in 1972, and a unique, modern railroad car loading facility. Center and right is the original 300,000 ton soda ash plant, constructed in 1952. By 1959 the capacity of the plant was expanded to 1.25 million tons. Continued expansion is predicted.

In 1972, the assessed valuation of all the trona operations in Sweetwater County was $14,616,185. This assessed valuation ranks trona second only to oil.

Photo courtesy of FMC Corporation, Green River, Wyoming



Dollar Value and Assessed Taxable Valuation of Mineral Production



SOON TO BE WYOMING'S LARGEST
COAL-FIRED POWER PLANT:

Jim Bridger Power Plant
Pacific Power & Light and Idaho
Power Company
Point-of-Rocks, Wyoming

Aerial view of the power plant being constructed 35 miles northeast of Rock Springs. Work is underway enclosing much of the structure for Unit #1.

The plant will utilize pulverized subbituminous coal from the Fort Union Formation to convert water to steam that drives the huge turbines. When this steam electric plant is completed, its rated capacity will be 1500 megawatts.

Sweetwater County coal mining had an assessed valuation of $1,261,982 in 1972. This valuation is not likely to measurably increase until the Jim Bridger strip mine is opened.

Photo courtesy of Pacific Power & Light Company, Casper, Wyoming

TRONA, URANIUM, AND OTHER MINERALS

A History of the Trona Industry in Sweetwater County

Trona produced, refined, and converted to soda ash at three mine and mill complexes northwest of the town of Green River now constitutes the third most valuable of the many mineral commodities produced in Wyoming. Trona is naturally occurring sodium sesquicarbonate ($Na_2CO_3 \cdot NaHCO_3 \cdot 2H_2O$) and is a brown to gray, soft, translucent mineral with a glassy or earthy appearance. Trona and other sodium minerals such as halite (NaCl, common salt) are found in abundance in beds of the Wilkins Peak Member of the Green River Formation in the central Green River Basin. These beds of saline minerals, which occur interlayered with oil shale, marl, limestone, tuff, siltstone, and sandstone, were deposited during cyclical or periodic evaporation of the waters of Lake Gosiute, an enormous lake with existed in southwestern Wyoming during the Eocene Epoch, some 50 million years ago. Approximately twenty-five different trona-bearing beds now lie buried at depths from 440 to 3500 feet beneath the present-day surface.

The first indications of saline minerals beneath the surface in Sweetwater County came to light before the turn of the century, when wells drilled for water at the town of Green River yielded sodium brines. Beginning in 1907, the Western Alkali Corporation undertook the commercial development of brine wells and evaporating facilities for extraction of sodium carbonate. The company drilled thirteen wells in the vicinity of Green River. The Western Alkali Corporation abandoned the brine project shortly following the end of World War I.

In January, 1938, an oil test drilled by Mountain Fuel Supply Company in the Westvaco area, twenty miles west of Green River, penetrated bedded trona at a depth of about 1600 feet. Core drilling by FMC Corporation, the Union Pacific Railroad, and the Potash Company of America in the early 1940's proved the existence of enormous tonnages of the mineral, and in 1946, FMC sank the first mine shaft. The first production of crude trona was recorded in 1948, and facilities for conversion of trona to soda ash were constructed in the mid-fifties.

Stimulated by the increasing numbers of uses for the industrial chemical called soda ash (Na_2CO_3) and by the phasing out of obsolete and heavily polluting soda ash manufacturing facilities in the East, growth of the trona-soda ash industry took on spectacular proportions in the early 1960's. Stauffer Chemical Company opened a completely integrated trona mine and soda ash plant in the summer of 1962 at Big Island, 17 miles northwest of Green River, and Allied Chemical Company began full-scale operations east of Westvaco and the FMC mine in 1968. The fourth company presently active in trona mining in Sweetwater County is the Texas Gulf Sulphur Corporation, who have announced their intentions to begin full-scale mining operations and construct a processing plant. Production of crude trona has climbed to 5,500,000 tons per year, and expansion is underway at all three currently producing facilities.

Today, over 40% of the soda ash produced in the United States comes from the trona mines of the Green River Basin. Most soda ash is used in the manufacture of glass, chemicals, paper, and soap.

The major problems facing the trona industry of Sweetwater County at the present time and in the near future involve the assurance of adequate natural gas supplies to maintain soda ash production throughout the year. FMC and Stauffer are attacking the problem by constructing their own pipelines to nearby gas fields and by contracting privately with the gas producers for supplies. Allied Chemical Company plans to use coal in its processing.

The solution of energy supply problems will insure continued rapid growth of Sweetwater County's trona industry for the foreseeable future. While a steady growth rate of 4 percent per year has been forecast for United States consumption of soda ash, the closing of more and more of the Eastern factories which manufacture soda ash can be anticipated. Expansion of the soda ash production of the Green River area will most likely supply the markets formerly served by these factories. There are estimated to be 50 billion tons of trona in beds of minable thickness in the Green River Basin (Deardorff and Manion, 1971). This almost inexhaustible resource will be a major factor in the economy of Sweetwater County for many years to come.

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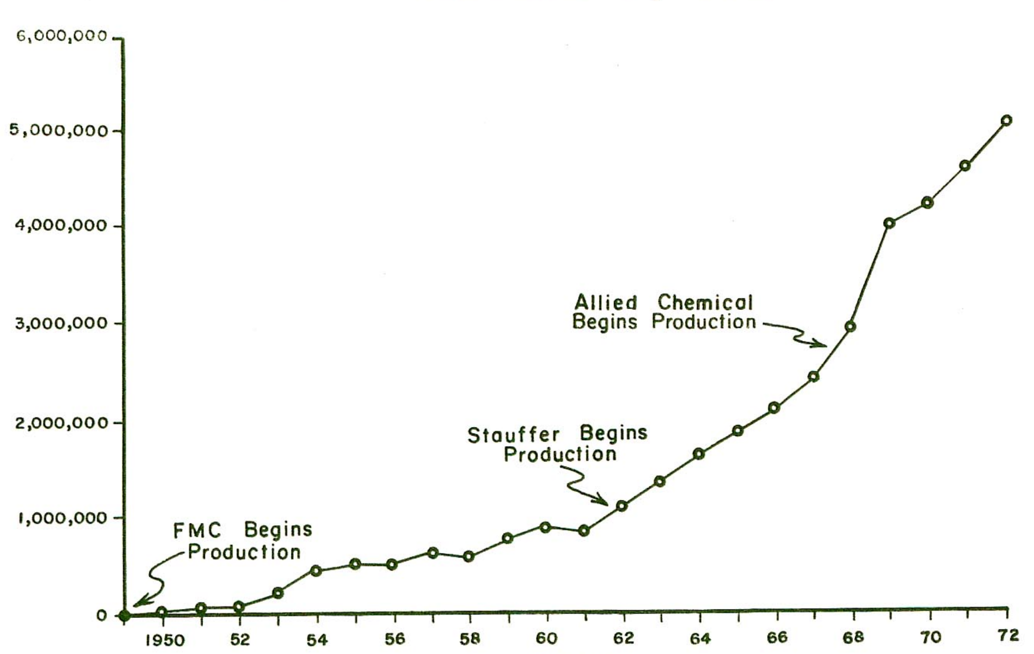
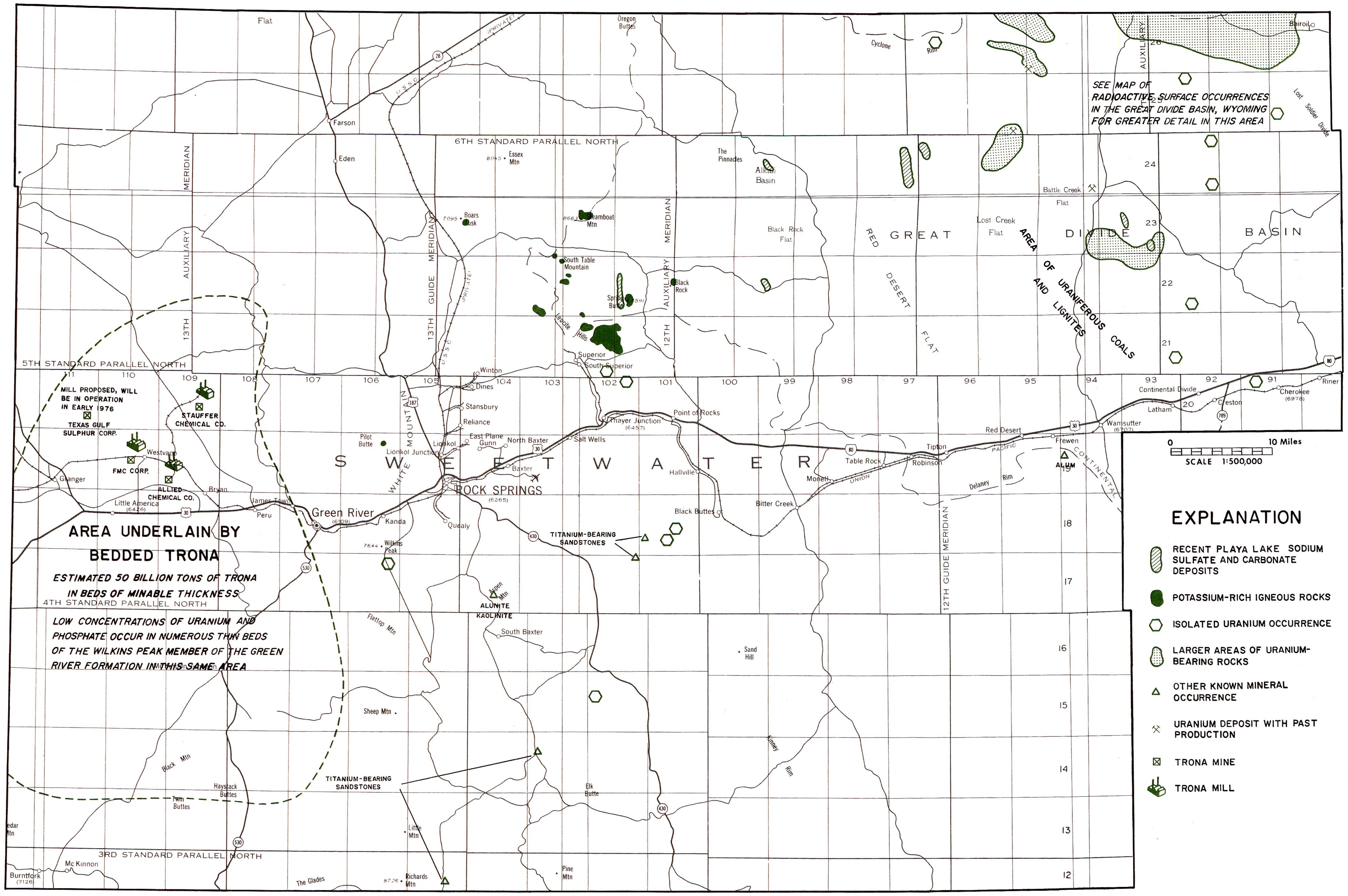
Trona Production by Year



SOURCE: STATE BOARD OF EQUALIZATION



Trona, Uranium, and Other Minerals

Some Undeveloped Mineral Resources in Sweetwater County

Potash. The volcanic rocks of the Leucite Hills, northeast of Rock Springs, have long been considered a potential source of potash, a chemical which is essential as a plant nutrient and therefore necessary for fertilizer manufacture. Early estimates placed the amount of potash potentially available from the rocks of the Leucite Hills at 197,349,617 tons (Schultz and Cross, 1912, p. 35). The potash of these rocks, however, is chemically bound into the mineral leucite ($KAlSi_2O_6$) and other silicate minerals. To this date, commercial extraction of potash from silicate minerals has not proven economically feasible. A plant was built during World War I for manufacturing KCl from the Leucite Hills rocks. Some production was recorded between 1918 and 1920, but the project was abandoned as soon as foreign supplies of potash again became accessible. The existence of large reserves of saline potash minerals in the United States and Canada will effectively preclude the development of a potash industry in Sweetwater County in the foreseeable future, as extraction of potash from potassium salts is a relatively inexpensive and commercially proven process.

Uraniferous Phosphatic Lake Beds. The lake deposits of Eocene Age in the Green River Basin contain numerous thin, laterally persistent layers which are anomalously rich in uranium and phosphorous. These beds lie, for the most part, within the same general area of occurrence as the trona beds. Uranium and phosphate concentrations in these beds are not of commercial proportions under present economic conditions, but might eventually be of interest as economic conditions continue to change. Analyses for 25 sampled zones in the Green River Area averaged .005 percent uranium and 2.2 percent P_2O_5. Similar beds are present in the Pine Mountain area 35 miles southeast of the town of Green River.

Titaniferous Black Sandstones. Black sandstones in the Mesaverde Group of Late Cretaceous age crop out at three localities in southern and central Sweetwater County. These unusual sandstones contain high concentrations of ilmenite, zircon, and monazite, three minerals of potential economic value. Ilmenite is a fairly abundant oxide of titanium and iron which is used for making titanium pigments for paints, papers, and plastics. Titanium metal is used as a structural material for aerospace construction. Zircon is zirconium silicate and is used mainly for facing molds for iron castings. Monazite is a source of the element thorium. Thorium will be used in the future as a fertile material in nuclear reactors of the breeder type. These rocks, though similar in mineral content to black beach sands of the Southeastern United States which are currently being mined for their ilmenite content, suffer the economic disadvantage of being moderately to strongly indurated. The additional expense required to crush these rocks prior to separation of the heavy minerals will cause these deposits to remain noneconomic for the foreseeable future.

Alunite. A very pure concentration of the mineral alunite ($KAl_3(SO_4)_2(OH)_6$), has been reported in bedded claystones on the south flank of Aspen Mountain, 12 miles southwest of Rock Springs. Alunite has been used since ancient times as a raw material to manufacture alum, ($KAl(SO_4)_2 \cdot 12H_2O$). The principal uses of alum are in water purification, dyeing, and in medicines. The Aspen Mountain deposits are relatively unexplored, but appear to consist of one or several layers of white claystone with considerable lateral extent. The claystone layers are in the lower part of the Bishop Conglomerate. The one claystone studied in some detail consists of up to 90% alunite, with kaolinitic clay minerals, feldspar, and quartz. No analyses have been made on similar claystone layers, some up to 6 feet thick, which have been observed in nearby coreholes and oil tests.

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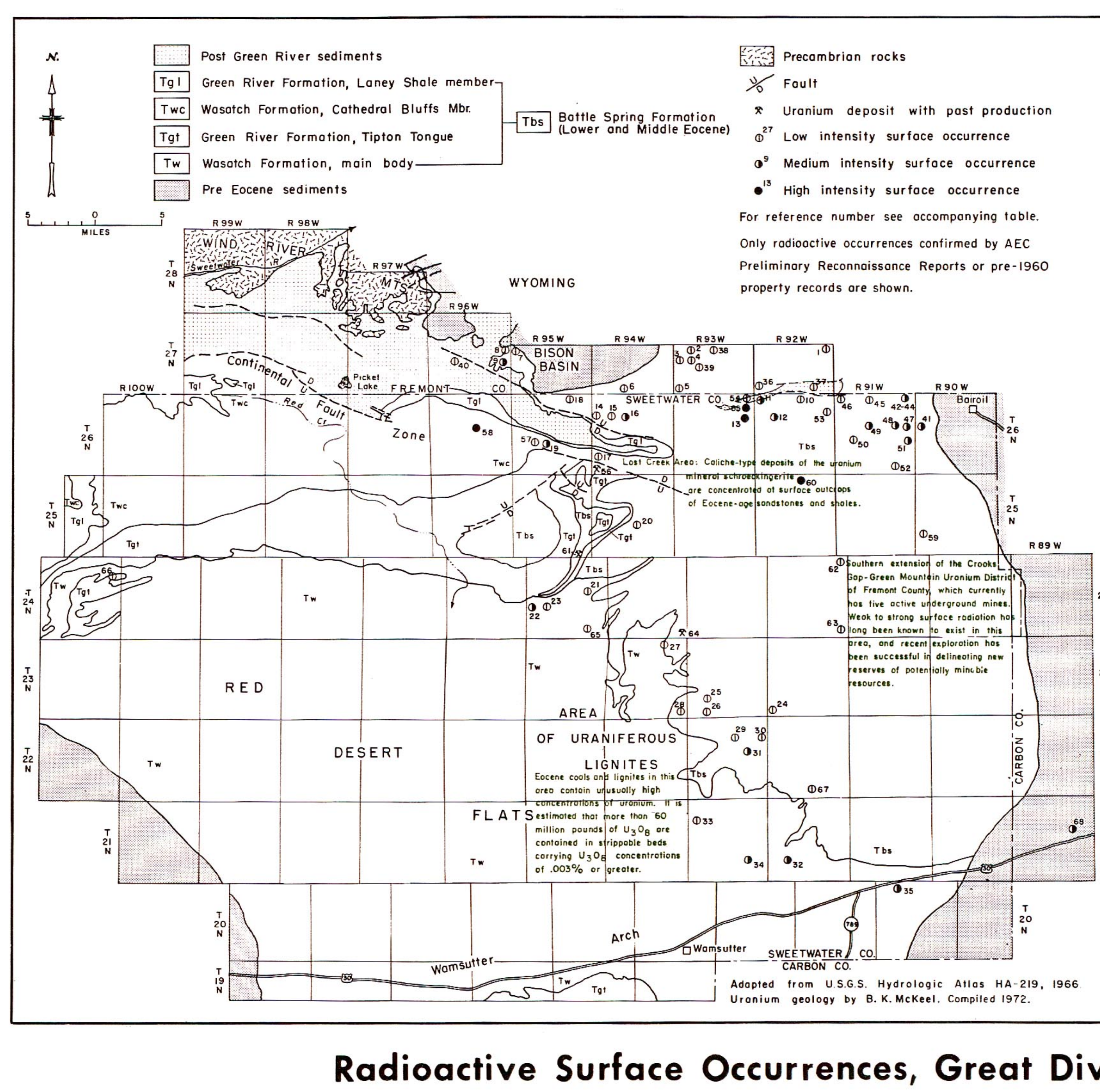

NO.	OCCURRENCE	LOCATION SEC.	TOWNSHIP	RANGE	LITHOLOGY	INTENSITY	SURFACE FM.
	(Airborne Anomalies)						
1	B17-78	13	27N.	92W.	Arkosic sandstone	⦶	Tbs
2	-66	17	↓	93W.	Shale	⦶	↓
3	-63,65	19	↓	↓	↓	⦶	↓
4	-64	20	↓	↓	↓	⦶	↓
5	-67	31	↓	↓	Calcareous siltstone	⦶	↓
6	-85,89	33	↓	94W.	Mudstone	⦶	↓
7	-77	18	↓	95W.	Conglomerate	⦶	↓
8	-76	13	↓	96W.	Gravel	⦶	↓
9	-75	24	↓	96W.	Unclassified	◐	↓
10	-72	3	26N.	92W.	Sandy shale	⦶	↓
11	-68	6	↓	↓	Arkosic sandstone	◐	↓
12	-86	8	↓	↓	↓	◐	↓
13	-69,70,71	12	↓	93W.	↓	●	↓
14	-59	7	↓	94W.	↓	⦶	↓
15	-60	8	↓	↓	↓	⦶	↓
16	-57,58	9	↓	↓	Sandy shale	◐	↓
17	-61	30	↓	↓	Calcareous shale	⦶	↓
18	-73	2	↓	95W.	Arkosic sandstone	⦶	↓
19	-74	21	↓	95W.	Arkosic conglomerate	◐	↓
20	-84	22	25N.	94W.	Silty soil	⦶	↓
21	-37	14	24N.	95W.	Shale	⦶	Tw
22	-39,40,41	19	↓	↓	Carbonaceous shale	◐	↓
23	-38	20	↓	↓	Carbonaceous shale	⦶	↓
24	-23	31	23N.	92W.	Shale	⦶	Tbs
25	-43	29	↓	93W.	Shale	⦶	↓
26	-44	32	↓	93W.	Carbonaceous shale	⦶	↓
27	-42	2	↓	94W.	Sandy shale	⦶	Tw
28	-45	36	↓	94W.	Carbonaceous shale	⦶	Tbs
29	-25	10	22N.	93W.	Shale	⦶	↓
30	-24	12	↓	↓	↓	⦶	↓
31	-21,22	14	↓	↓		◐	↓
32	-16,17,18	29	21N.	92W.	Carbonaceous shale	◐	Tw
33	-20	7	↓	93W.	↓	⦶	↓
34	-19	26	↓	93W.	↓	◐	↓
35	56-8	5	20N.	91W.	Shale	◐	↓
	(Other Occurrences)						
36	Butte	31	27N.	92W.	Arkosic sandstone	⦶	Tbs
37	Big Bertha	35	↓	92W.	↓	⦶	↓
38	Friday 13th	15,16	↓	93W.	↓	⦶	↓
39	Serg. Regs	20,21, 28,29	↓	↓	↓	⦶	↓
40	Lone Wolf	20,21	↓	96W.	Sandstone, fn. gr.	⦶	Tu
41	Lost Soldier	18	26N.	90W.	Arkosic sandstone	◐	Tbs
42	C & L	1	↓	91W.	↓	◐	↓
43	Deihl	1	↓	↓	↓	◐	↓
44	Hays	1	↓	↓	↓	◐	↓
45	Sandy	4	↓	↓	↓	⦶	↓
46	Emily	6	↓	↓	↓	⦶	↓
47	Black Eagle	13	↓	↓	↓	◐	↓
48	Valley View	14	↓	↓	↓	◐	↓
49	State school	16	↓	↓	↓	◐	↓
50	?	20	↓	↓	↓	⦶	↓
51	Jayhawk, Titunkas	24	↓	↓	↓	◐	↓
52	Bab	35	↓	↓	↓	⦶	↓
53	Iris	12	↓	92W.	↓	⦶	↓
54	Lost Creek	1	↓	93W.	Sandstone, fn. gr.	⦶	↓
55	Wycal	1,12	↓	93W.	Arkosic sandstone	●	↓
56	Golden Arrow	30,31	↓	94W.	Silty soil	⚒	Tgt
57	Jim, Bob, Pontiac	21,22	↓	95W.	Arkosic sandstone	⦶	Tbs
58	Jabcig	15	↓	96W.	↓	●	Tw
59	Wasatch	30	25N.	90W.	↓	⦶	Tbs
60	Gamma Ray	3	↓	92W.	↓	●	↓
61	Lone Wolf	35	↓	95W.	↓	⚒	↓
62	Cox	1	24N.	92W.	↓	⦶	↓
63	State school	36	↓	92W.	↓	⦶	↓
64	State school	36	↓	94W.	↓	⚒	↓
65	Sandy	35	↓	95W.	Siltstone	⦶	Tw
66	Merrimack	12	↓	101W.	Limestone	⦶	Tgt
67	Yore	34	22N.	92W.	Carbonaceous shale	⦶	Tbs
68	Sunset	14	21N.	89W.	Arkosic sandstone	◐	Tfu

Radioactive Surface Occurrences, Great Divide Basin

Slightly modified from United States Atomic Energy Commission Preliminary Map No. 33, by B. K. McKeel, 1972.

Uranium in the Northern Great Divide Basin

Radioactive mineral occurrences in the Great Divide Basin of Sweetwater County are generally concentrated into three major areas. These are (1) the southern extension of the Crooks Gap-Green Mountain Uranium Mining District southward across the northeast county line from Fremont County, (2) the caliche-type surface deposits of the uranium mineral schroeckingerite in the Lost Creek area, and (3) the widespread but very low grade concentrations of uranium in coals, lignites, and carbonaceous shales in the area north of Wamsutter. Other widespread, low grade deposits occur in the phosphatic lake beds of the Wilkins Peak Member of the Green River Formation, and scattered uranium occurrences have been noted in the Ericson Formation on the Rock Springs Uplift.

Uranium in the Crooks Gap-Green Mountain District, of Fremont County, where five underground mines are currently operating, occurs in coarse sandstones and gravels of the Eocene Battle Spring Formation. Similar sands and gravels, and the same kind of uranium mineralization, extend southward into Sweetwater County. Exploration drilling by several different companies has, in the past few years, outlined potentially minable ore bodies in Sweetwater County. As demand for uranium is anticipated to increase steeply in the near future, development of one or more of the uranium properties in the northeastern corner of Sweetwater County can be expected in the next four to five years.

The schroeckingerite deposits of the Lost Creek area are not extensive, as they are mainly surface accumulations or encrustations formed by the evaporation of uranium-bearing ground-water at or near the outcrop surface. The deposits seem to be controlled also by fracturing along the Cyclone Rim Fault Zone. Fractures which permitted ground-water to rise to the surface under capillary and artesian pressures appear to have facilitated the development of this type of deposit. The Battle Spring Formation is the major host rock for this mineralization.

The Eocene coals and lignites in the area north of Wamsutter are estimated to contain more than 60 million pounds of U_3O_8 in those beds at strippable depth having a U_3O_8 content of .003% or greater. This type of low grade deposit is, of course, uneconomical under present conditions. However, technological advances in extraction methods and depletion of currently exploited high grade uranium deposits could combine to make these deposits a valuable resource ten to twenty years from now.

As indicated on the accompanying map, uranium ore production has taken place at three scattered localities in northeastern Sweetwater County. None of these surface mines produced significant amounts of ore.

The Battle Spring conglomerates and sandstones of northeastern Sweetwater County are presently one of the major targets for exploration by the uranium industry in Wyoming. Discoveries already made in the area make it probable that major production of uranium ore will be undertaken within the next four to five years.

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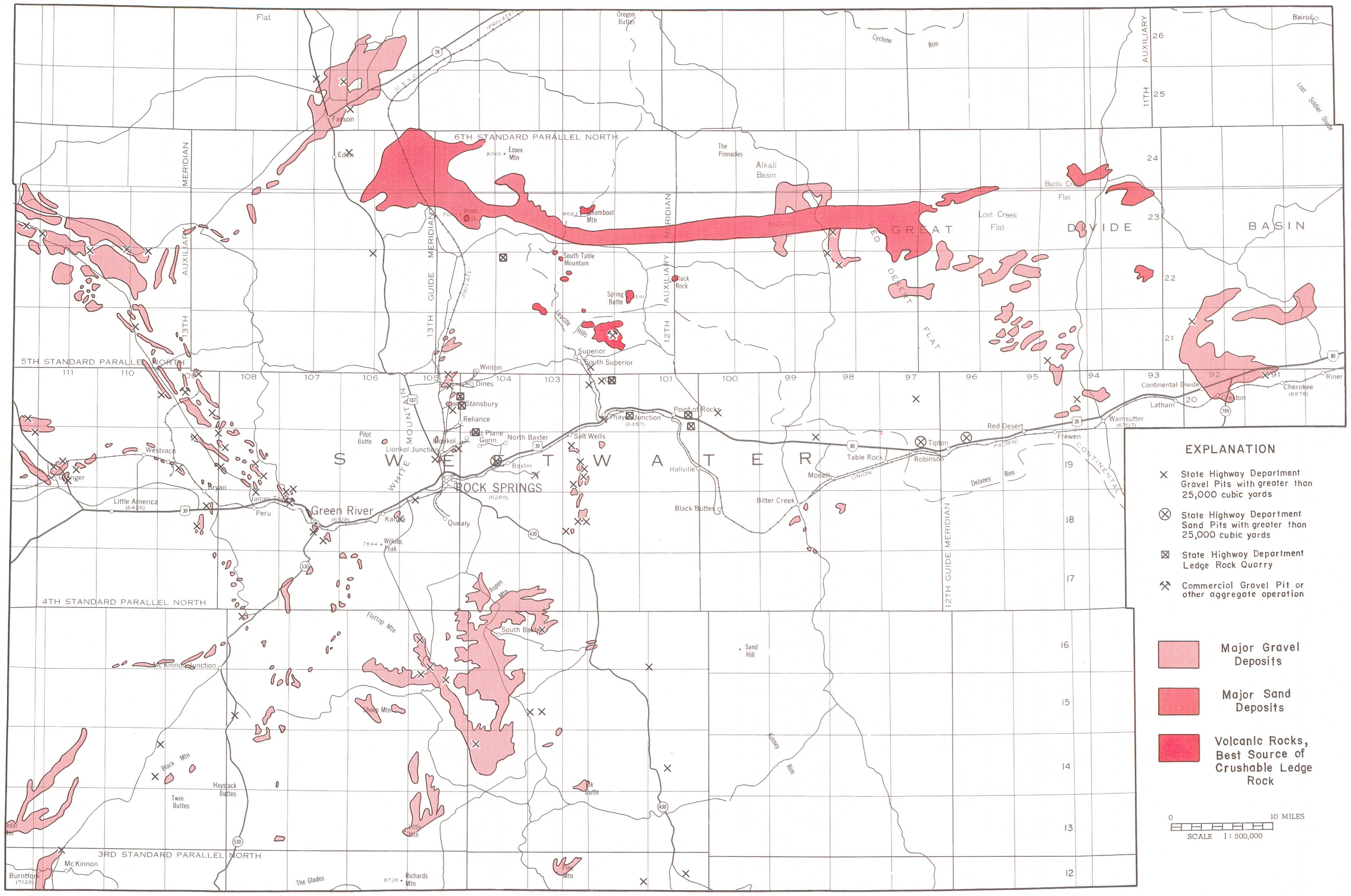
CONSTRUCTION MATERIALS



Sand, Gravel, and Crushable Aggregate Rock

Sand, Gravel and Crushable Aggregate Rock

In any area undergoing accelerated development and population growth, such as is now the case with Sweetwater County, those mineral resources which can be used in the construction of new houses, business and industrial facilities, and roadways take on increased importance. Mineral deposits which formerly had little economic value may become valuable resources when sufficient local demand is generated. The value of a deposit of sand, gravel, or crushable rock almost always hinges on the local demand, as the costs of transporting such materials generally makes them noncompetitive in markets more than fifty miles from the source. Continued development and population growth in Sweetwater County will undoubtedly require greater development of the local sand and gravel resources.

Mapping of deposits of highway construction materials is carried on regularly by the Wyoming Highway Department and the United States Bureau of Public Roads. A preliminary survey of the sand and gravel deposits of Sweetwater County was made under the Missouri River Basin Development Program in the late 1940's. Data obtained from these sources were used in compiling the accompanying map, Sand, Gravel, and Construction Materials Resources of Sweetwater County.

The principal gravel deposits of Sweetwater County lie on alluvial terraces above the valley of the Green River. These terraces are best developed upstream from the town of Green River and extend all the way to the Lincoln County line. Up to six terrace levels rise in steps on either side of the broad valley along this stretch of the Green. The terraces are elevated from 20 to 450 feet above the river bottom.

Only two lower terraces are developed near the town of Green River. From that point south to the Utah state line, gravel deposits are small, patchy, and difficult to reach.

Gravels on the terraces upstream from the town of Green River range from 8 to 30 feet in thickness. (G. M. Richmond, 1948, p. 164). The gravel is generally well graded, with from 25 to 35 per cent sand and 10 to 15 per cent silt and clay sized material. Overburden is thin on the upper level terraces and thicker on the back sides of the lower terraces.

Patchy terraces above the valleys of Sandy Creek, Hams Fork, Blacks Fork, and Henry's Fork contain lesser amounts of sand and gravel. Extensive deposits of poorly graded, fine gravel also occur in the Wamsutter-Creston area.

The Tertiary age Bishop Conglomerate, a formation which caps some of the high mesas south of Rock Springs, could be an excellent source of gravel and sand in the future.

The major sand dune field which extends almost 60 miles eastward from the north end of the Rock Springs Uplift constitutes the major sand deposits of the county.

Very little of the bedrock which crops out in Sweetwater County is sufficiently hard to be utilized as crushed rock for surfacing roads or as aggregate in concrete. The major exceptions are the Tertiary volcanic flow rocks of the Leucite Hills. Scattered thin units in the Mesaverde Group of formations are also sufficiently indurated to be used as crushed rock aggregate.

Also in the Leucite Hills volcanic area are several small but prominent volcanic cones composed mainly of pumice. Pumice is a light-weight, frothy appearing, volcanic glass which can be utilized as a light-weight aggregate for concretes. Some of the pumice in the Leucite Hills occurs in large blocks and has an attractive buff to brown color. In the past, this stone was used in minor amounts for a decorative facing stone.

The careful mapping and inventorying of construction materials deposits and potential quarrying sites are essential steps in the development of a plan for orderly expansion in an area of growing population. Once such an inventory has been made, development can perhaps be diverted from areas of known gravel or other useful mineral deposits. Such deposits will than remain available for extraction with minimum disruption and economic loss when the need arises.

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Richmond, G. M., 1948, Sweetwater County in A reconnaissance of the sand and gravel deposits of Wyoming, an unpublished report prepared as part of the Missouri River Basin Development Program. Copies are on file in the offices of the Wyoming Geological Survey, Laramie, and the Wyoming Highway Department, Cheyenne.

U.S. Bureau of Public Roads and Wyoming Highway Department Construction Materials Surveys along Interstate Route I-20.

Clay

Structural clay products include brick tile, sewer pipe, and many other manufactured clay products used in construction. The properties which determine the suitability of a particular clay or shale deposit for use in structural clay products include (1) the plasticity and strength of the clay, (2) the amount of shrinkage the clay undergoes during drying and firing, (3) the temperature or range of temperatures at which the clay vitrifies, and (4) the color of the clay after firing. Although clays occur in association with many of the coal beds of Tertiary and Cretaceous age around the Rock Springs Uplift, little testing of these clays for the above-mentioned properties has been done.

The Fort Union, Lance, Lewis, Almond, and Rock Springs Formations all contain clay beds which appear to be relatively pure. Tests run on clays from near the Stansbury Coal Mine (Section 19, T20N, R104W) and the Superior mines (Section 29, T21N, R102W) indicate that these clays from the Rock Springs Formation would be marginally suitable for structural clay products (Van Sant, 1961, p. 73-78). Further exploration and testing around the Rock Springs Uplift should be fruitful in locating higher quality clays of good economic potential.

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Cement Rock

The raw materials used in the manufacture of portland cement must contain lime, silica, alumina, and iron oxides. The ideal cement rock contains in its natural state these components in proportions close to those desired for the end product. A number of Eocene limestones and marlstones of Western Sweetwater County have chemical compositions close to the standards desired for cement rock.

Like other construction-related minerals industries, the cement industry rises or falls with the population and industrial growth rate of the surrounding area. The availability of raw materials and fuel supplies may favor the development of a cement industry in southwestern Wyoming, but such a venture will become economically attractive only if continued development of several of the other minerals industries in this area produces large population increases.

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Potential Construction Materials in Sweetwater County

Age		Stratigraphic Unit	Thickness	Character	Construction Materials Potential
QUATERNARY		Alluvium	0-50'	Channel fill and flood plain deposits of clay, silt, sand, gravel and boulders.	Good source of sand and gravel. Water table at or near ground surface.
QUATERNARY		Sand Dunes	0-30'	Wind blown sand. Dormant to semi-dormant stage.	Fine to medium-grained sand, non-plastic, probably can be used for borrow.
QUATERNARY		Glacial Deposits	0-100'	Unsorted to poorly sorted, angular to subrounded, clay to boulder size, glacial debris.	Could be used as source of gravel. Clayey areas & many large boulders will be a major problem.
QUATERNARY		Terrace Deposits	0-40'	Clay, silt, sand, gravel and boulders. Unconsolidated but firmly cemented in places.	Good source of construction material. Generally is clean, well graded, hard gravel.
TERTIARY	Pliocene	Tertiary Volcanics	0-350'	Intrusive and extrusive masses of leucite lava and cinder cones.	Excellent source of large quantities of crushable ledge rock.
TERTIARY	Miocene	Browns Park Formation	0-330'	White massive soft tuffaceous sandstone & white marl with basal conglomeratic interbedded gravels & small boulders.	Not a good source of construction material. Basal conglomerate rather thin where exposed and apparently has a high clay content.

Age		Stratigraphic Unit	Thickness	Character	Construction Materials Potential
TERTIARY	Miocene	Bishop Conglomerate	0-100'	Poorly sorted, moderately to firmly cemented fine gravels, sand and boulders of red quartzite roundstone, grey chert & limestone with grey to white tuffaceous sandstone matrix.	Could be a major source of highway construction material.
TERTIARY	Eocene	Bridger Formation	2500'	Green to grey shale, siltstone, marlstone claystone, mudstone, some fresh water limestone and conglomerate.	Lenses of limestone or marlstone could contribute to the supply of construction material, however, none with sufficient thickness or areal extent are known.
TERTIARY	Eocene	Green River Formation	1500'	Thin-bedded, drab sandstone, siltstone, mudstone, fresh water shale, limestone & evaporite deposits	No construction material deposits located within this formation.
TERTIARY	Paleocene and Eocene	Wasatch Formation & Fort Union Formation	1000'-9000'	Variegated claystones and shale, and drab sandstone with some conglomerate.	No construction material deposits located within this formation.

Age	Stratigraphic Unit	Thickness	Character	Construction Materials Potential
UPPER CRETACEOUS	Lance Formation Lewis Shale	2250'	Massive white to yellow sandstone; gray and brown lenticular sandstone beds; gray, soft, marine shale; coal beds and many concretions.	Could contain clays and shales usable in structural clay products
UPPER CRETACEOUS	Mesaverde Group Almond Formation Ericson Sandstone Rock Springs Formation Blair Formations	3100'-4550'	White, gray and brown, massive, soft sandstone; sandy and carbonaceous shales; thin, lenticular conglomerate beds; numerous coal beds; hard, dark brown to gray, thin, lenticular marine sandstone beds at top and bottom.	The hard, dark brown to gray, thin lenticular marine sandstone at the top and bottom of the Mesaverde group is a source of crushable rock where exposures of sufficient thickness and area are located. Could contain clays and shales usable in structural clay products.
UPPER CRETACEOUS	Baxter Shale	1000'	Gray to black soft shale and shaley sandstone.	Not a source of construction material.

Information taken from United States Bureau of Public Roads and Wyoming Highway Department Construction Materials Surveys.

WYOMING GEOLOGICAL SURVEY, 1973

QUATERNARY	
Qal	Alluvial deposits
Qs	Wind-blown sand
Qgl	Glacial deposits
Ql	Lake deposits
Qg	Gravel deposits

TERTIARY	
Pliocene (?)	
Ti	Igneous flows and plugs
Miocene (?)	
Tbp	Browns Park Formation
Oligocene or Miocene	
Tbi	Bishop Conglomerate
Eocene	
Tub	Uinta and Bridger Formations
Tb	Bridger Formation
Tgl	Laney Shale Member, Green River Formation

TERTIARY (Continued)	
Tgw	Wilkins Peak Member, Green River Formation
Tgt	Tipton Tongue or Tipton Shale Member, Green River Fm.
Twc	Cathedral Bluffs Tongue, Wasatch Formation
Tw	Main body of the Wasatch Formation
Tgwe	Stratigraphic equivalents of upper and middle tongues, Green River Formation, and upper tongue and New Fork Tongue, Wasatch Formation
Tbs	Battle Spring Formation
Paleocene	
Tf	Fort Union Formation
Undivided	
Tu	Tertiary Rocks undivided

CRETACEOUS	
Kla	Lance Formation
Kle	Lewis Shale
Kmv	Mesaverde Group undivided
Kal	Almond Formation, Mesaverde Group
Ke	Ericson Formation, Mesaverde Group
Kr	Rock Springs Formation, Mesaverde Group
Kbl	Blair Formation, Mesaverde Group
Kba	Baxter Shale
Kc	Cody Shale
	Cretaceous and Older
K€r	Cretaceous thru Cambrian rocks

COMPILED FROM

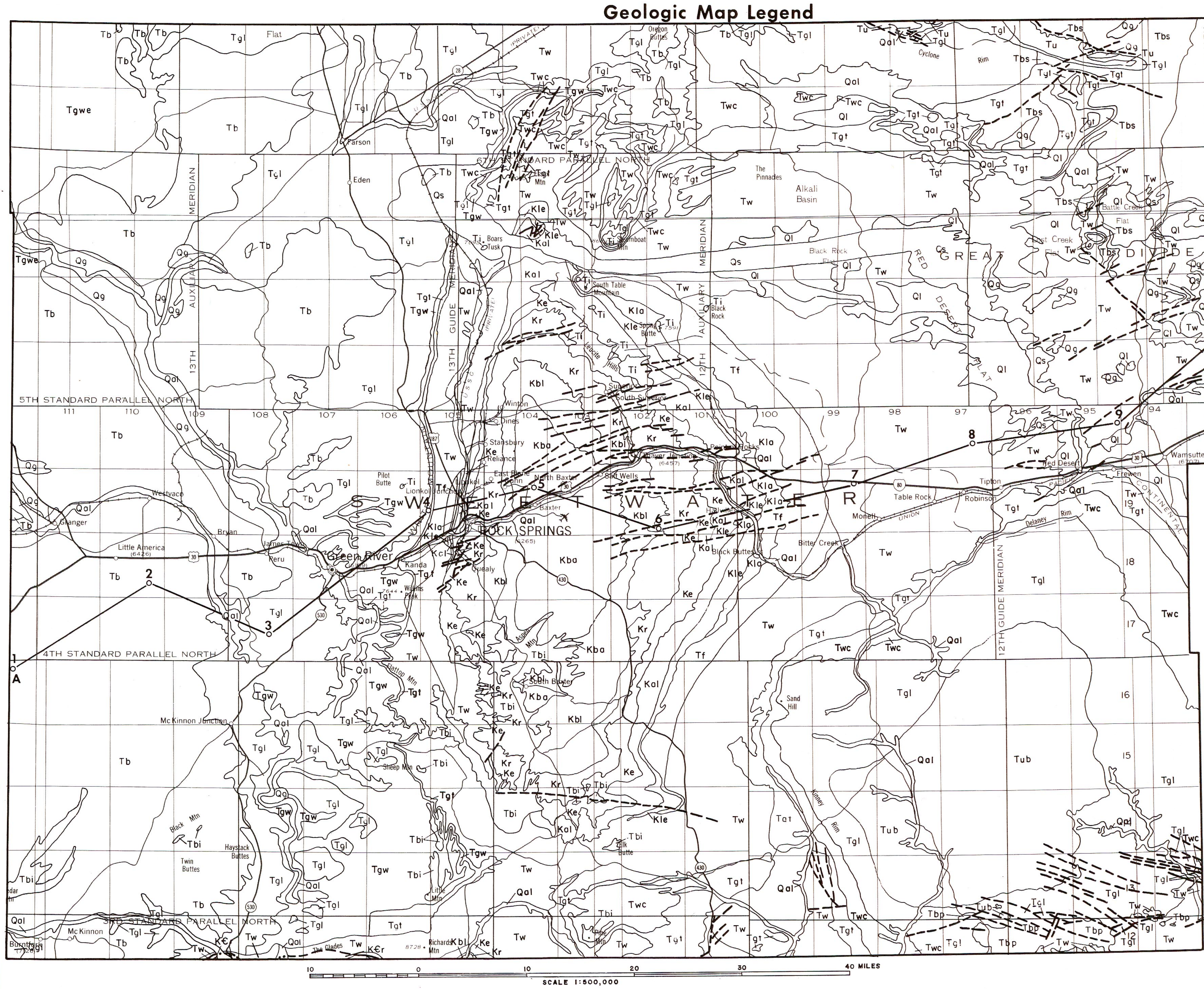
Welder, G. E. and McGreevy, L. J., 1966, Ground-water reconnaissance of the Great Divide and Washakie Basins and some adjacent areas, southwestern Wyoming: U.S. Geological Survey Hydrologic Investigations Atlas HA-219, sheet 1 of 3, 1:250,000

Welder, G. E., 1968, Ground-water reconnaissance of the Green River Basin southwestern Wyoming: U.S. Geological Survey Hydrologic Investigations Atlas HA-290, sheet 1 of 2, 1:250,000

MAP SYMBOLS

———	Formation Contact
- - - - -	Fault, Approximately located
A——A'	Line of Cross Section

Geologic Map Legend



Geological Map of Sweetwater County

Geology of Sweetwater County

Sweetwater County spans an area of more than 10,400 square miles at an elevation between 6000 and 8700 feet above sea level. It includes all or part of five major structural features: the Green River Basin on the west, the oval shaped Rock Springs Uplift near the center of the county, the Great Divide, or, as it is sometimes called Red Desert Basin, the Washakie Basin, and the Wamsutter Arch. With the exception of a few small volcanic deposits (both intrusives and extrusives) on the north end of the Rock Springs Uplift, all of the countys' surface bed rock is of sedimentary origin, probably less than one hundred million years old. As shown near the top of the stratigraphic column, the bedrock is composed of sediments deposited here during the latter part of Cretaceous time or during the Cenozoic era. The oldest strata exposed at the surface are part of the Baxter-Hilliard Shale that crop out along the uplifted crest of Lost Soldier anticline in the extreme northeast corner of the county.

The generalized stratigraphic column below shows the vertical positions of the more significant formations in the county and their relative thickness. All strata beneath (older than) the Baxter Shale are known only from drill hole data. As illustrated on cross section A--A', drill hole data substantiates an overall thickness of sedimentary rocks between 10,000 and 30,000 ft. within the county. These strata are underlain everywhere by very old crystalline rocks of igneous origin usually referred to as Precambrian "basement."

While the geological history of Sweetwater County is by no means complete, there is ample evidence to show that the area was subjected many times to millions of years of burial beneath the sea and, other prolonged periods of erosion when the surface was well above sea level. The interested reader is referred to publications indicated on the reference list for further detail on these subjects as well as the area's structural history of uplift, downwarp, faulting and subsidence.

The mineral resources of Sweetwater County are a direct result of events that happened during its geologic past. The location and distribution of the county's trona deposits are, for example, related to the chemical deposition from rich carbonate brines concentrated in a large inland lake west of Rock Springs during the Eocene period. Petroleum, natural gas and other hydrocarbons accumulated in the mud and sand in sediments of other ages, in other places, and at other times.

Unlike many of the other counties in Wyoming, Sweetwater is indeed fortunate to have had geological conditions that resulted in the accumulation of what are now accessible mineral deposits that are useful to man. Many more generations of geological study and drilling will be required before the full impact of Sweetwater County's mineral resources can be fully evaluated. New remote imagery (shown below) derived as a part of the ERTS satellite sensing program is the type of advanced technology that will greatly enhance our understanding of these complex relationships.

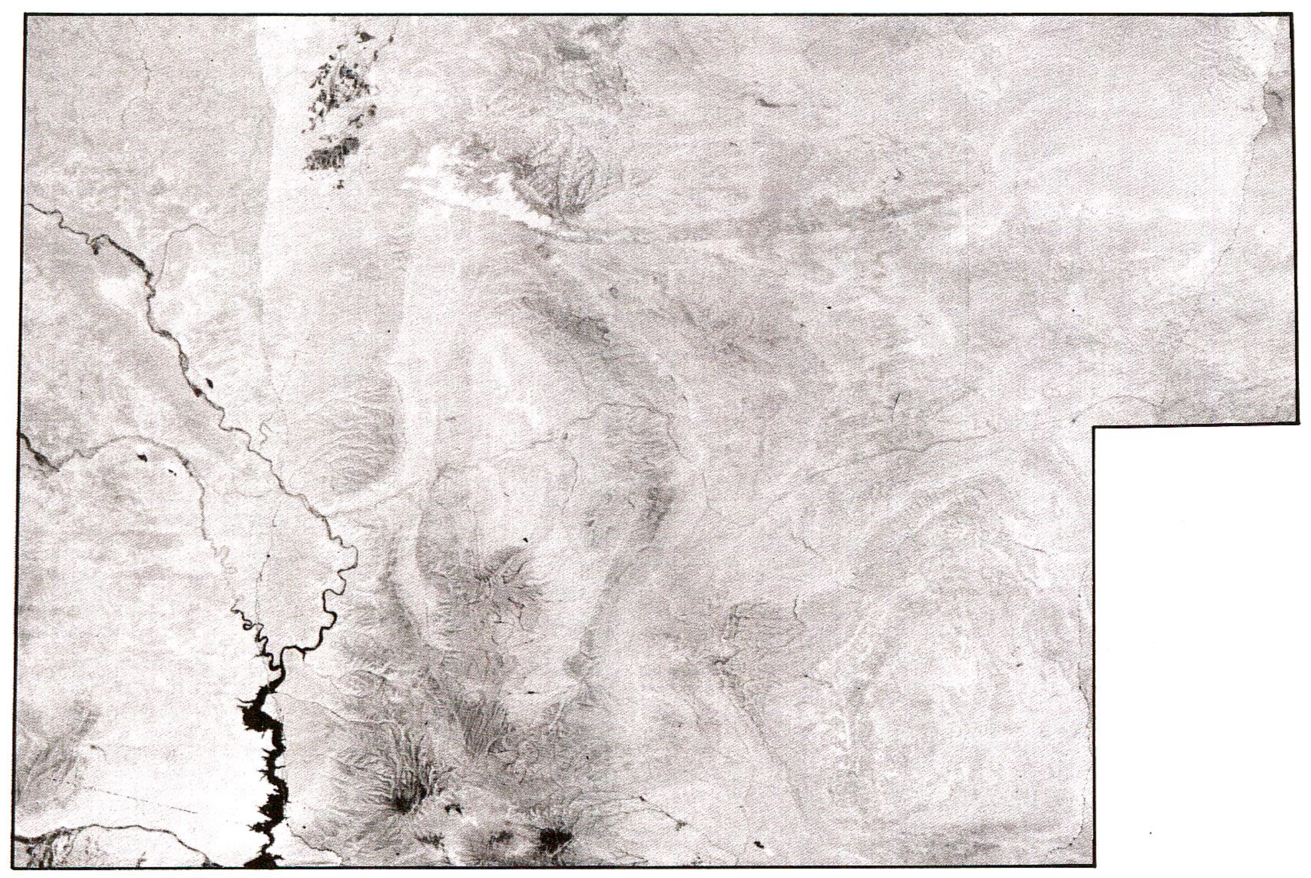
References:

Tenth Annual Field Conference Guidebook - Green River Basin (1955) published by Wyoming Geological Association P.O. Box 545 Casper, Wyoming 82601

Twenty-fifth Annual Field Conference Guidebook - Geology and Mineral Resources of the Greater Green River Basin (1973) published by Wyoming Geological Association P.O. Box 545 Casper, Wyoming 82601

Public information on ERTS satellite imagery and photos may be obtained from the Earth Resources Observation Systems, Data Center, 10th and Dakota Ave., Sioux Falls, South Dakota 57198 or call (605) 339-2270

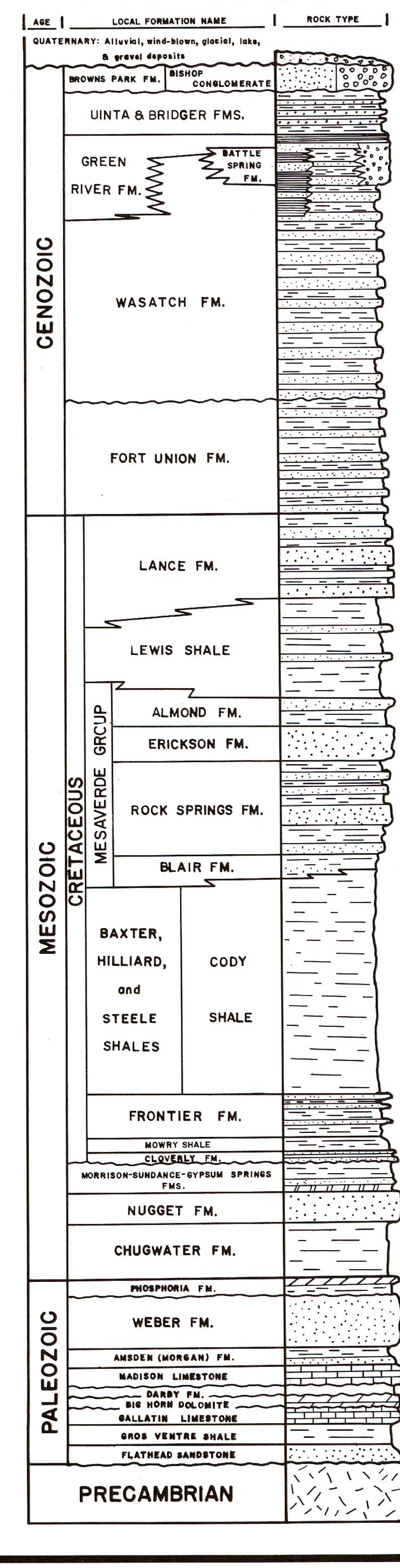
Geologic Atlas of the Rocky Mountain Region (1972) published by Rocky Mountain Association of Geologists, 526 Midland Savings Bldg. Denver, Colorado 80202

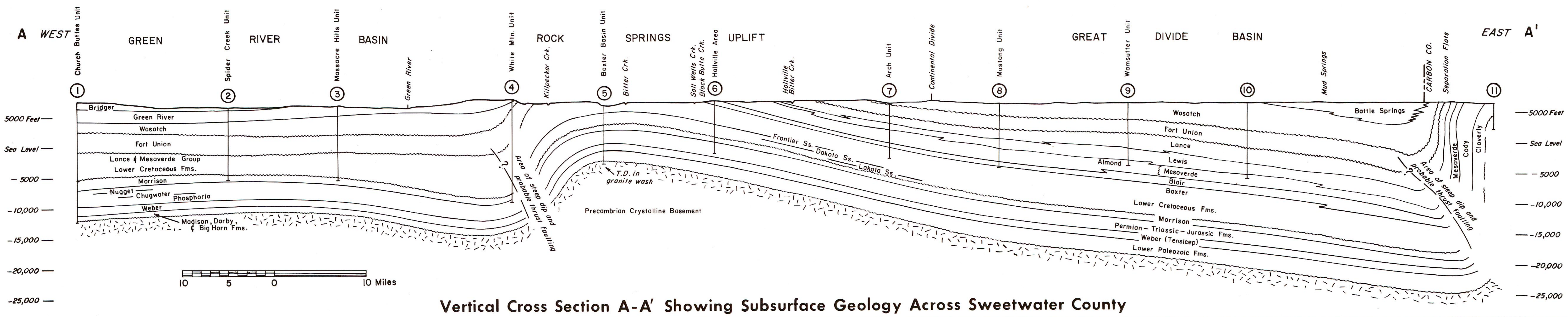


Photograph of the land surface of Sweetwater County as reproduced from ERTS-A satellite data obtained in 1972 showing readily identifiable geologic features illustrated on the geologic map. The satellite orbits the earth at an altitude of more than 500 miles transmitting data to the NASA space flight center in Houston, Texas. The data is processed in many forms (including color) and is made available to the public at modest prices through the information center at Sioux Falls, South Dakota (See Reference list).

Stratigraphic Column

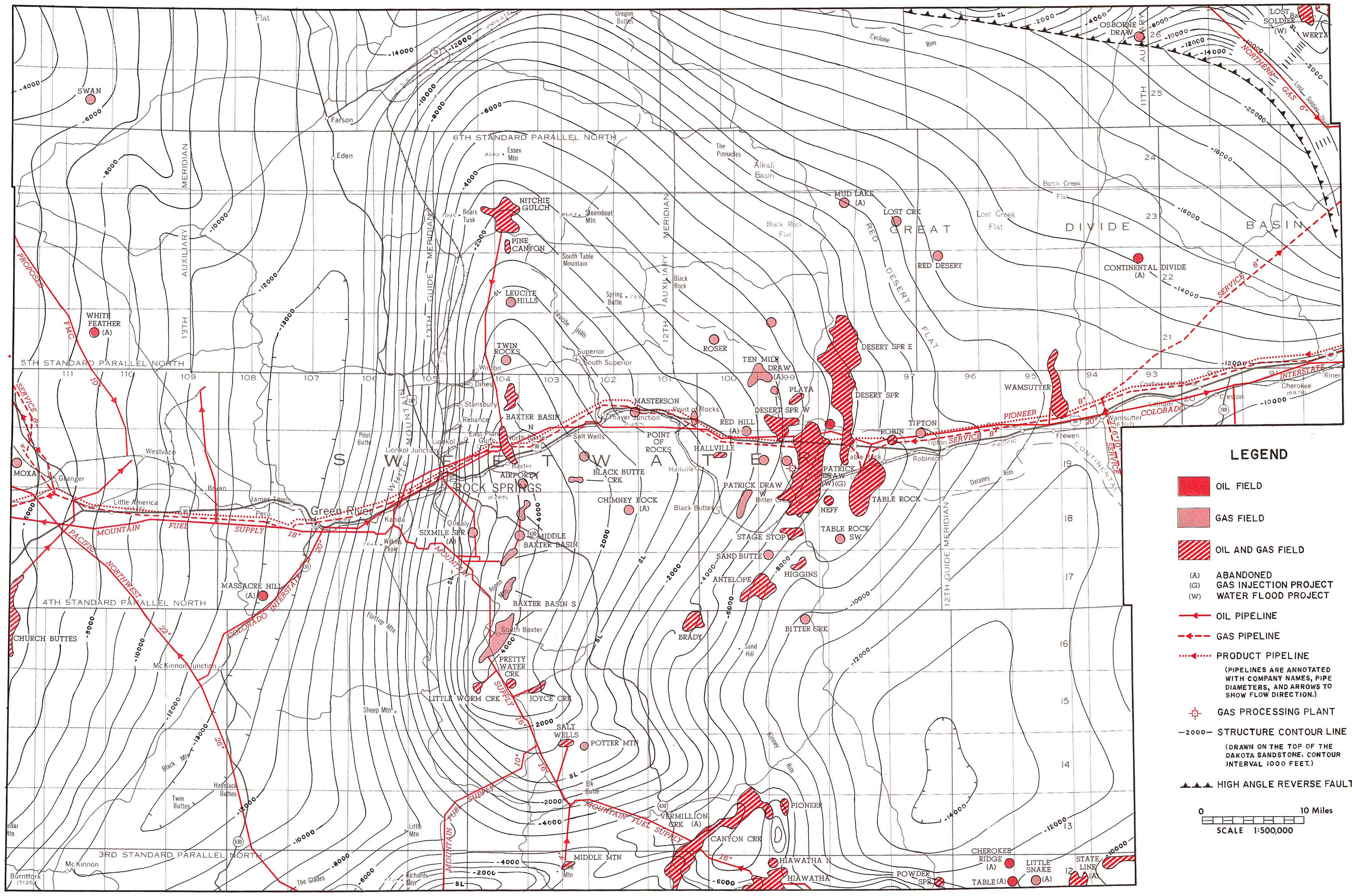
(VERTICAL SEQUENCE OF ROCK FORMATIONS WITHIN SWEETWATER COUNTY)





Vertical Cross Section A-A' Showing Subsurface Geology Across Sweetwater County

PETROLEUM AND NATURAL GAS



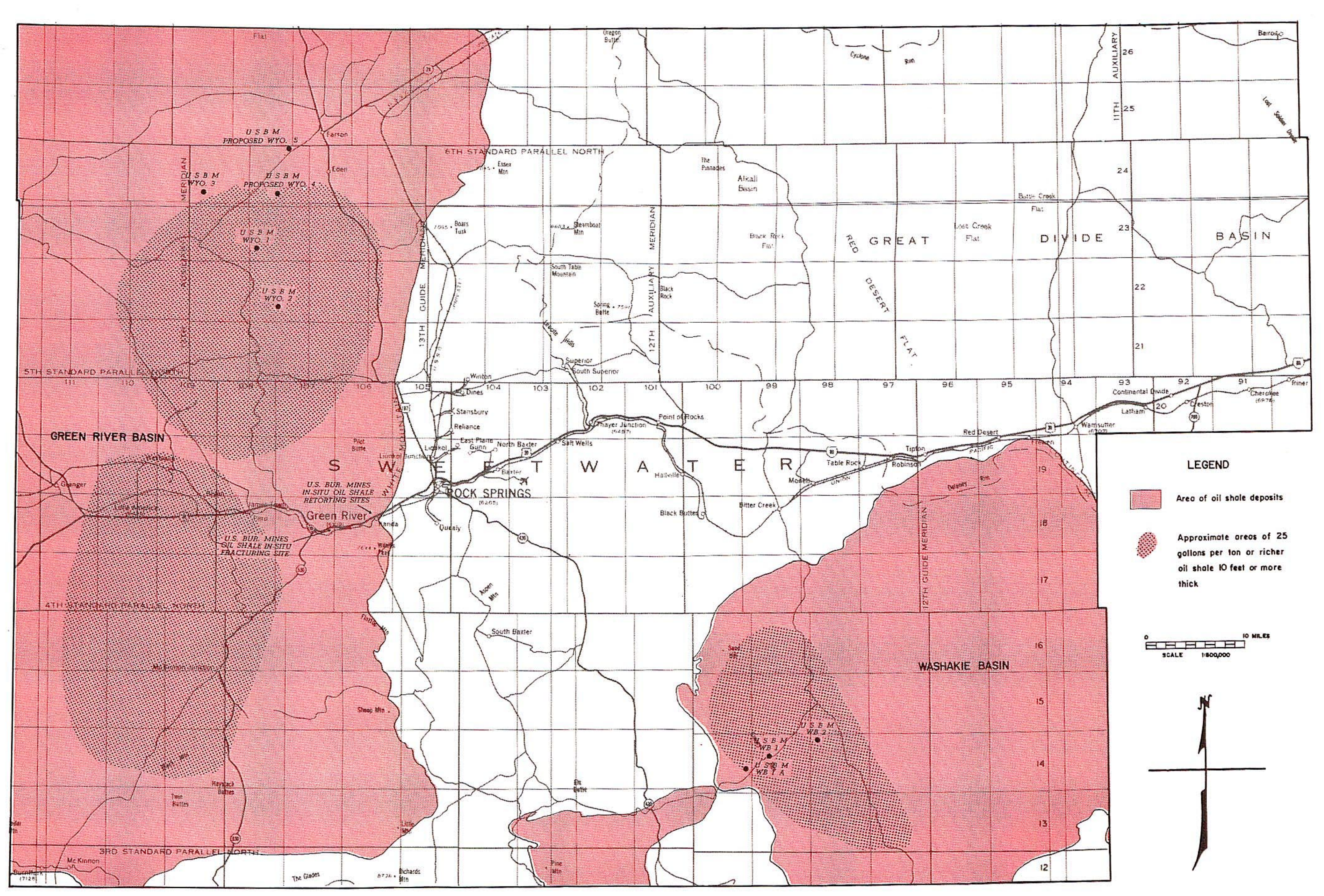
Oil and Gas Fields in Sweetwater County

Oil and Gas Production

TOTAL CUMULATIVE PRODUCTION AND STATUS OF OIL AND GAS FIELDS
(DATA FROM WYOMING OIL & GAS CONSERVATION COMMISSION)

FIELD NAME & LOCATION (TWP.-RGE.)	DISCOVERY DATE	TOTAL PRODUCTION TO DEC. 31, 1972 OIL (Barrels)	GAS (MCF)	FIELD STATUS
Airport (19N-103W)	1972	0	0	new discovery
Antelope (17N-99W)	1970	1,470	2,542,417	producing
Arch Unit (includes portions of Patrick Draw and Desert Springs Fields) (19N-98W)	1959	16,036,486	65,117,327	producing
Baxter Basin, Middle (18N-103W)	1938	0	14,957,575	producing
Baxter Basin, North (19N, 20N-104W)	1926	2,541	65,431,573	producing
Baxter Basin, South (16N, 17N-104W)	1922	0	144,643,204	producing
Bitter Creek (16N-99W)	1962	1,759	686,739	producing
Black Butte Creek (19N-102W)	1959	0	67,150	producing
Brady (16N, 101W)	1972	0	0	new discovery
Canyon Creek (13N-100W; 12N, 13N-101W)	1941	763,957	127,485,872	producing
Cherokee Ridge (12N-96W)	1961	1,344	0	abandoned
Chimney Rock (18N-102W)	1956	0	0	abandoned
*Church Buttes (16N-112W, 113W; 17N-112W)	1956	31,770	237,787,242	producing
Continental Divide (22N-93W)	1964	30,078	0	abandoned
Desert Springs (20N, 21N-97W, 98W)	1958	680,382	81,401,295	producing
Desert Springs, East (21N-97W)	1965	71,941	4,704,867	producing
Desert Springs, West (19N, 20N-99W)	1959	316,744	5,521,754	producing
Halliville (19N-100W)	1962	23,536	2,737	shut-in
Hiawatha & Hiawatha, North (12N-99W)	1928	34,307	53,163,932	producing
Higgins (17N-99W)	1969	2,167	955,379	producing
Jackknife Springs (included in Brady Field) (16N-101W) (Name now rescinded)	1960	312	310,804	producing
Joyce Creek (15N-103W)	1958	53,156	8,337,547	producing
Leucite Hills (22N-103W)	1969	0	342,584	producing
Little Snake (12N-94W, 95W, 96W)	1962	0	632,053	abandoned
Little Worm Cr. (15N-104W)	1957	107,348	4,082,907	shut-in
Lost Creek (23N-97W)	1972	0	0	no report
Lost Soldier (26N-90W)	1916	152,267,161	59,239,035	producing
Massacre Hill (16N, 17N-107W, 108W, 109W)	1962	759	0	abandoned
Masterson (20N-102W)	1970	0	192,674	producing
Middle Mountain (12N-103W)	1952	56,062	8,372,031	producing
Monell Unit (Part of Patrick Draw Field) (18N, 19N-99W)	1964	29,464,553	96,617,156	producing
*Moxa (18N, 19N-112W)	1961	0	903,280	producing
Mud Lake (23N-98W)	1959	0	0	abandoned
Neff (18N-98W)	1968	255	32,795	shut-in
Nitchie Gulch (23N-103W)	1962	115,778	33,509,947	producing
Osborne Draw (26N-93W)	1971	0	0	new discovery
Patrick Draw & Patrick Draw, West (18N-99W, 100W)	1959	743,892	2,838,921	producing
Pine Canyon (23N-103W)	1964	13,015	1,808,018	producing
Pioneer (13N-99W)	1959	15,661	9,754,600	producing
Playa (20N-99W)	1958	255,627	12,725,523	producing
Point of Rocks (20N-101W)	1963	0	645,864	producing
Potter Mountain (14N-103W)	1956	0	391,660	abandoned
Powder Springs (12N-97W)	1970	32,861	1,654,546	producing
Pretty Water Creek (15N-104W)	1962	184	829,072	producing
Red Desert (22N-96W)	1971	0	0	shut-in
Red Hill (19N-100W)	1962	0	14,913	shut-in
Robin (19N-97W)	1971	16,221	38,197	producing
Roser (21N-100W)	1971	0	0	shut-in
Round Table (12N-96W)	1967	9,224	0	abandoned
Salt Wells (14N-103W)	1949	316,565	10,379,810	producing
Sand Butte (17N-99W)	1960	0	924,832	producing
Sixmile Spring (18N-104W)	1962	0	249,105	abandoned
Stage Stop (18N-99W)	1966	302,535	1,450,160	producing
State Line (12N-94W, 95W)	1959	14,625	493,100	abandoned
Swan (25N-110W)	1970	0	0	shut-in
Table Rock & Table Rock, South (18N, 19N-97W, 98W)	1946	1,722,293	121,403,179	producing
Table Rock, Southwest (18N-98W)	1955	0	657,215	producing
Ten Mile Draw (21N-98W, 99W)	1962	0	0	abandoned
Tipton (19N-97W)	1972	0	24,251	shut-in
Trail (13N, 14N-100W)	1958	213,874	35,093,597	producing
Twin Rocks (21N-103W)	1956	0	0	shut-in
Vermillion Creek (Part of Canyon Creek on map) (13N-100W, 101W)	1961	253	24,204	abandoned
Wamsutter (20N, 21N-94W, 95W)	1958	224,985	16,604,703	producing
*Wertz (26N-89W, 90W)	1920	65,593,237	49,578,896	producing
Whitefeather (21N-110W)	1972	1,792	0	abandoned
	TOTAL	269,506,091	1,284,626,242	

*indicates field is partly in Sweetwater County



Oil Shale Deposits

Oil Shale

Collectively, 3700 square miles of some of the more remote portions of the Green River and Washakie Basins of Sweetwater County are underlain by oil shale. This laminated, oil-bearing rock, which is more exactly an organic-rich, dolomitic marlstone, was deposited 60 million years ago in Eocene freshwater lakes. From youngest to oldest, these lake deposits occur in the Laney Shale member of the Green River Formation, the Wilkins Peak Formation, and the Tipton Shale. The latter two formations contain the highest grade shale with yields often in excess of 25 gallons of oil per ton of rock.

It is estimated that there is between 370 and 430 billion barrels of shale oil contained in Wyoming oil shale deposits 10 feet or more in thickness and yielding 10 or more gallons per ton. This gives Wyoming the second largest shale oil resources in the nation.

Near Rock Springs the U.S. Bureau of Mines successfully recovered shale oil by an in-situ method of extraction as early as 1969. Although the in-situ utilization of oil shale has perhaps the greatest potential, surface mining and underground mining are also under investigation.

Three Wyoming oil shale sites have been nominated to be offered in a proposed Federal lease sale in 1973. This lease sale is designed to initiate commercial manufacture of shale oil.

REFERENCES

U.S. Dept. Interior, 1972, Draft environmental statement for the proposed prototype oil-shale leasing program: three volumes, Sept. 1972

Wyoming Oil Shale Environmental Planning Committee, 1971, Environmental and economic report on Wyoming oil shale: available through Wyoming Dept. Economic Planning & Development, Cheyenne, Wyoming

Petroleum and Natural Gas in Sweetwater County

Exploration for oil began in Sweetwater County about 1915 using various mapping techniques of the surface geology. The first significant oil discovery was made in 1916 on this basis at what is now Lost Soldier field (T.26N. R.90W.) a clearly defined, northwest trending anticline with multiple producing horizons. In the years that followed surface geology and the seismograph were used to define other anticlines like Wertz, Baxter Basin, Hiawatha, and Table Rock, which were also found to be productive. To date, more than two-thirds of the oil and gas produced in the county has been recovered from closed anticlinal traps, due in large part to the extensive production from Lost Soldier Field.

Although exploration for structural traps still continues, with the use of the seismograph and aerial photographs, the trend of exploration shifted during the 1950's and 60's to stratigraphic sandstone reservoirs in the Lewis, Mesaverde and other relatively shallow Cretaceous formations. Combinations of favorable shoreline facies and source beds will continue to attract new exploration for a long time to come.

Drilling depths in the county range from about 2000 feet, to test the Frontier sandstone on the Rocks Springs Uplift, to more than 18,000 feet to test the Madison Limestone at Church Buttes field in the Green River Basin. Recent discovery of the Brady Field in T.16N. R. 101W. has spurred interest in the deeper strata.

Potential Reservoirs: Gas and/or oil shows have been reported from practically every stratigraphic unit older than the Green River Formation. Commercial production, however, is another matter limited to date to a dozen notable horizons. Closed anticlinal structures have encountered oil bearing reservoir rocks in the Upper Cretaceous Frontier, Lewis, and Mesaverde and Lower Cretaceous Dakota-Lakota sandstones, the Jurassic Morrison and Nugget Sandstones, the Permian Phosphoria dolomite and the Pennsylvanian Weber Sandstone. Lost Soldier field is somewhat unique in this regard in also having important pay zones in the Mississippian Madison Limestone and the Cambrian Flathead Sandstone.

Subsurface well control within Sweetwater County is still too sparse to evaluate the many and varied stratigraphic conditions that exist here. It is clear however that many of the formations show abrupt changes in facies and structure that are conducive to oil and gas entrapment. Those interested in knowing more about specific stratigraphic conditions and production potential of the county should begin with published material in the reference list.

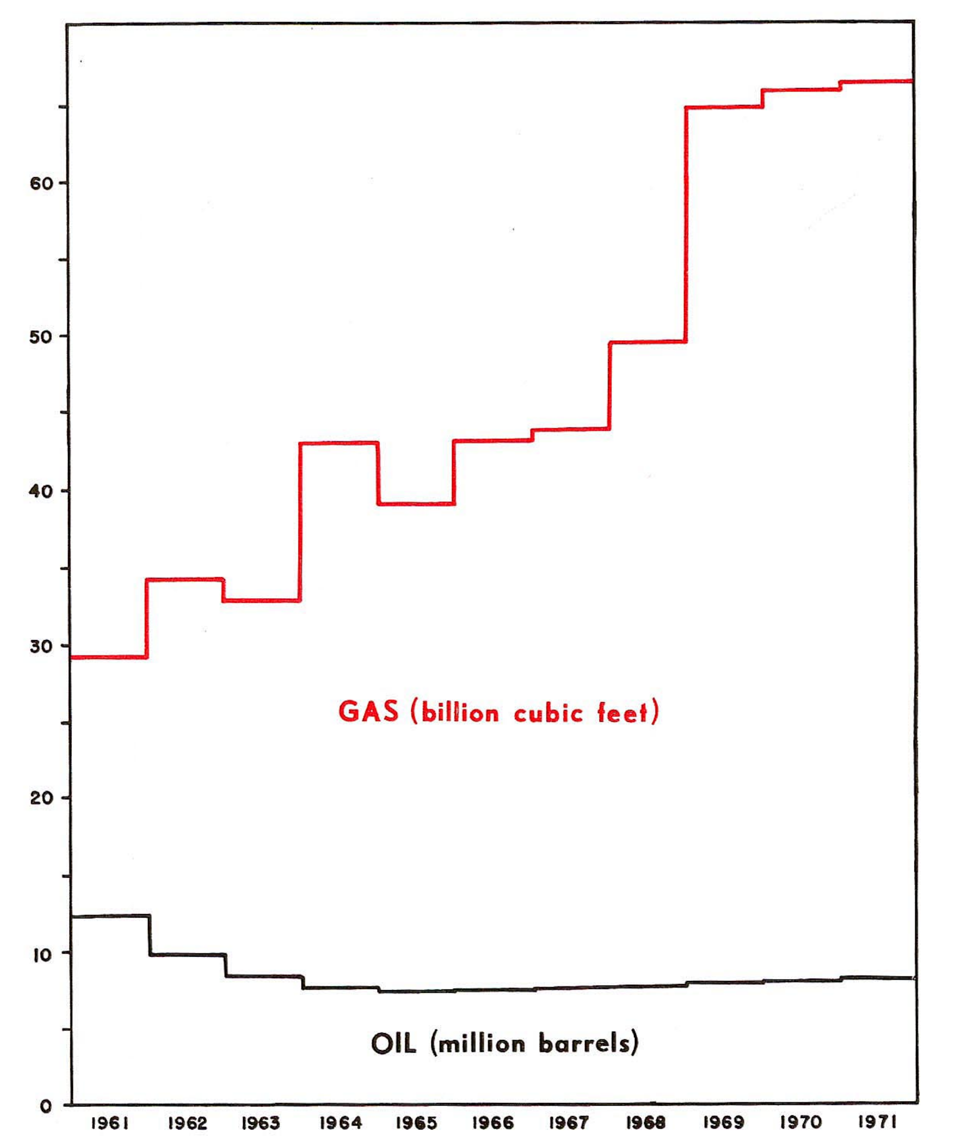
References

Tenth Annual Field Conference Guidebook - Green River Basin (1955) published by Wyoming Geological Association, P.O. Box 545 Casper, Wyoming 82601

Twenty-fifth Annual Field Conference Guidebook - Geology and Mineral Resources of the Greater Green River Basin (1973) published by Wyoming Geological Association, P.O. Box 545 Casper, Wyoming 82601.

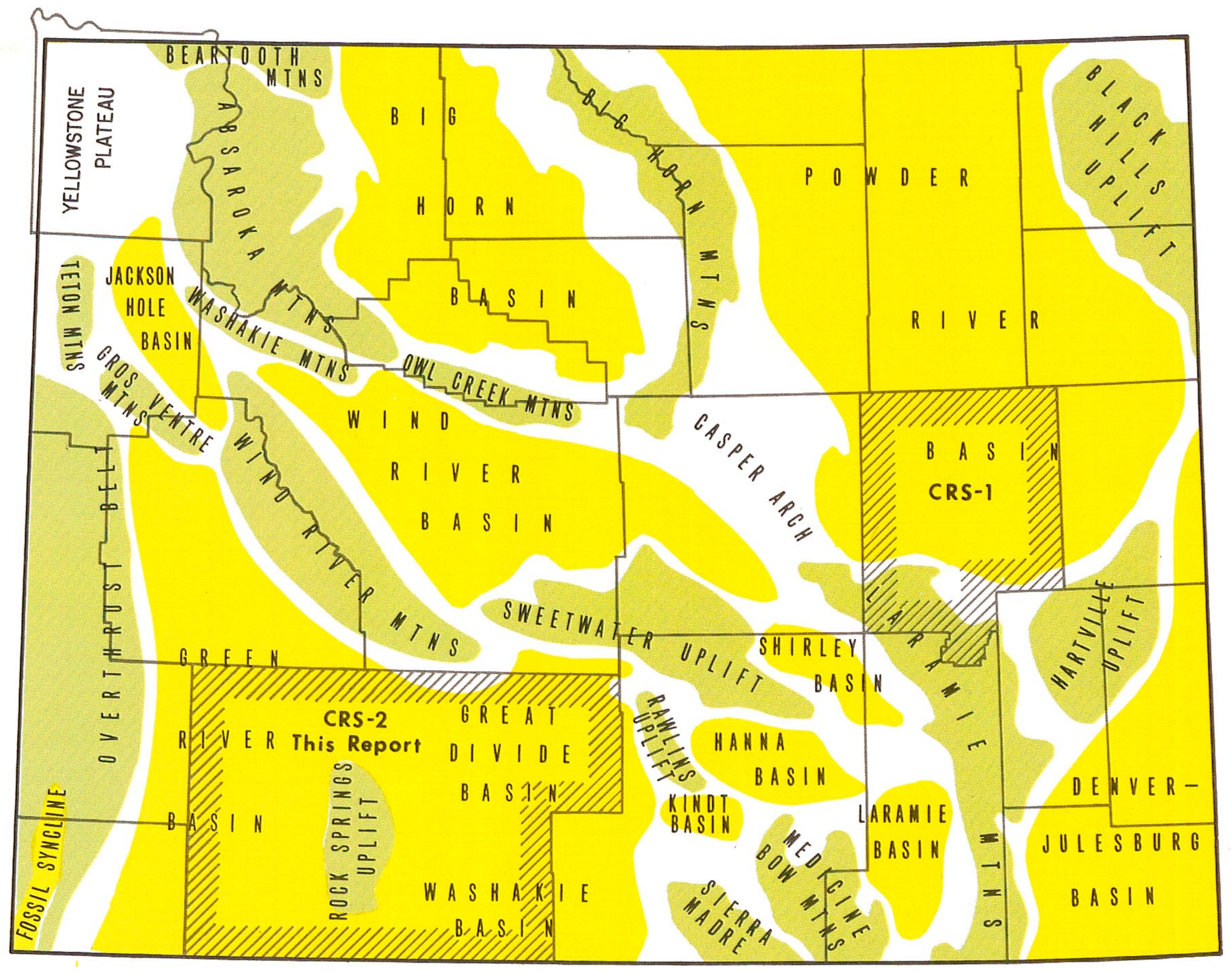
Geologic Atlas of the Rocky Mountain Region (1972) published by Rocky Mountain Association of Geologists, 526 Midland Savings Bldg., Denver, Colorado 80202

Wyoming Oil and Gas Statistics (1972) published by the Wyoming Oil and Gas Conservation Commission, P.O. Box 2640, Casper, Wyoming 82601

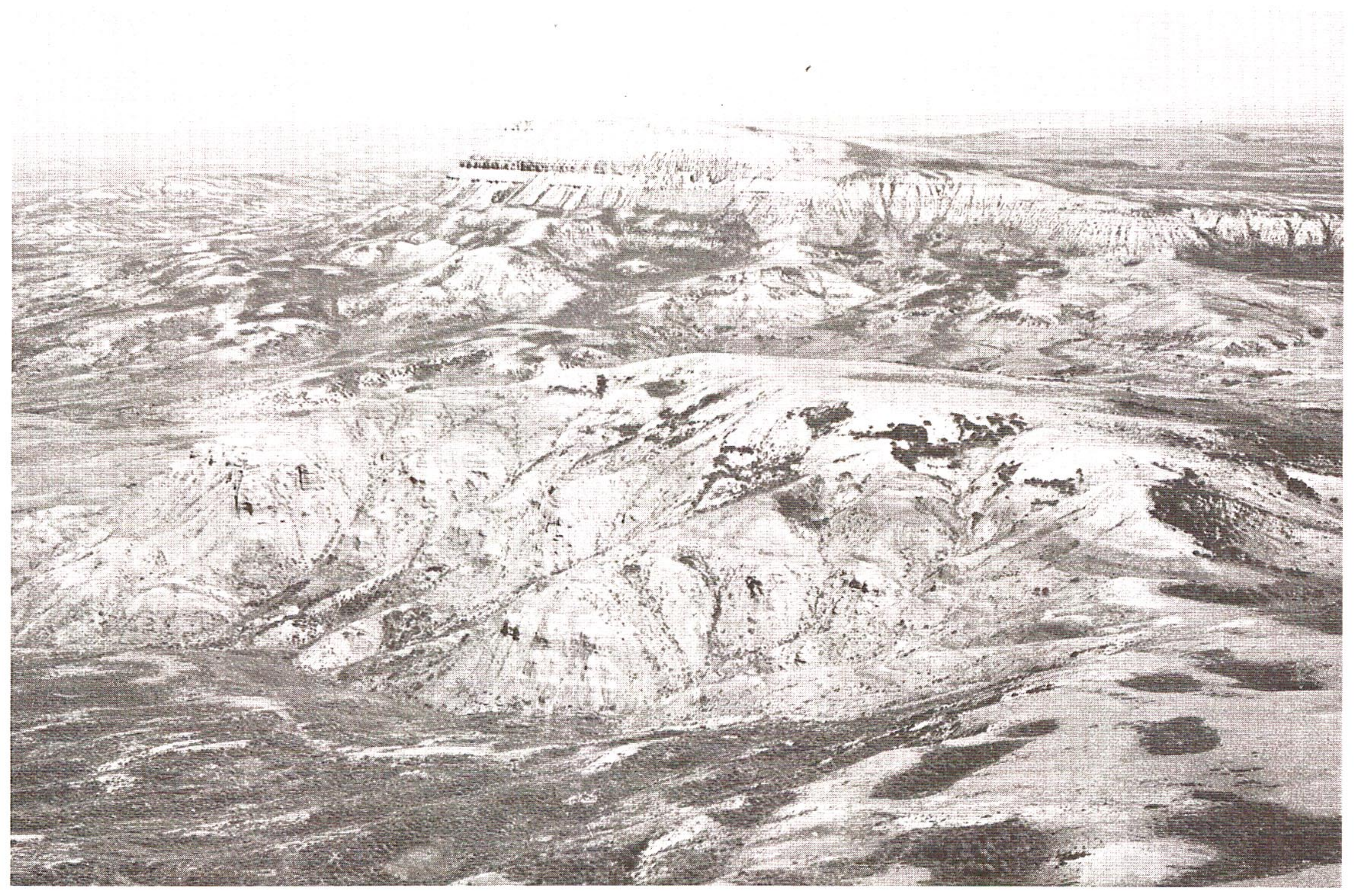


Data Source: State Board of Equalization
Ad Volorem Tax Department

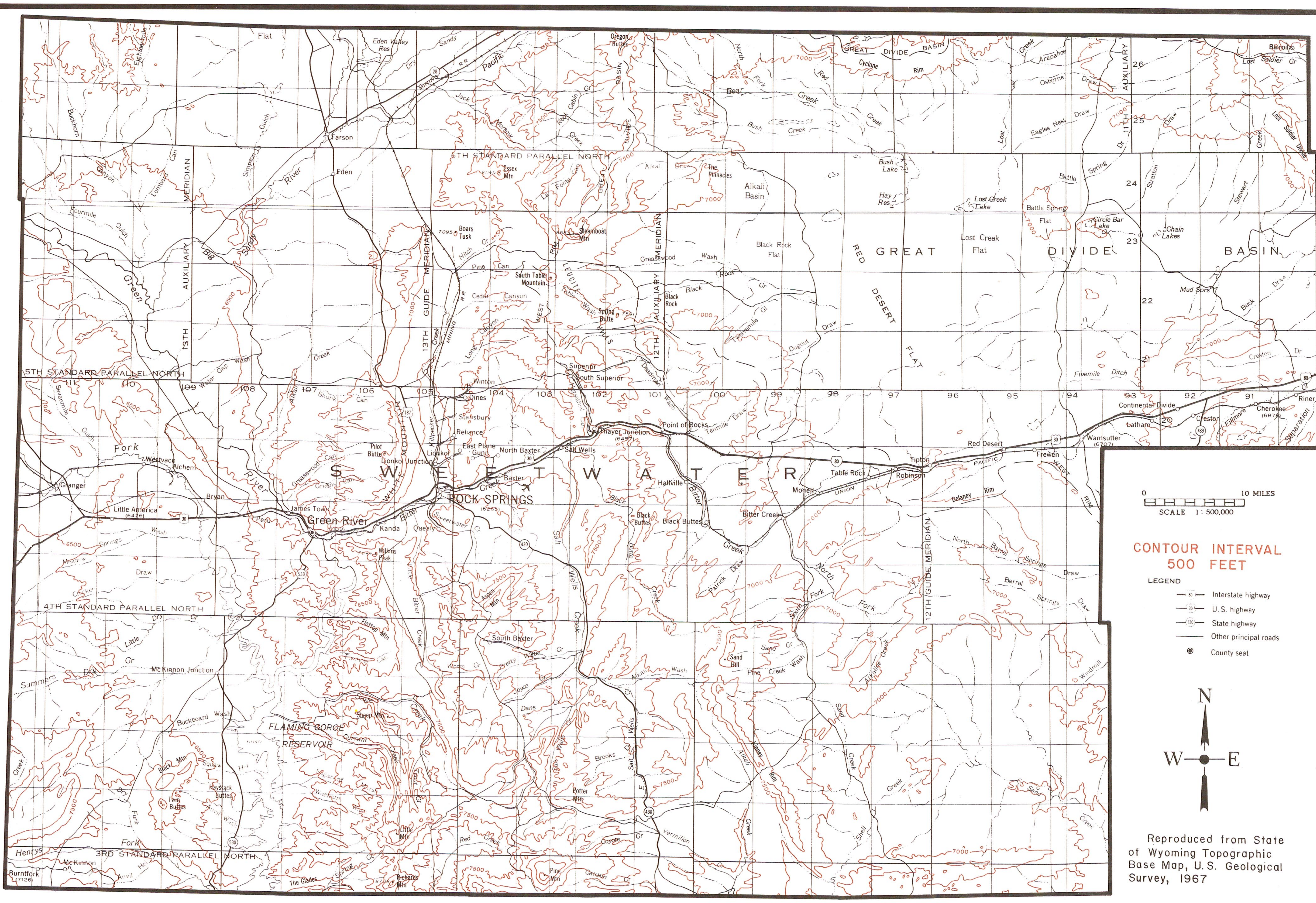
Annual Oil and Gas Production



Index Map to County Resource Series Reports



Northward view of Sand Butte in Section 33, T16N, R100W, on the west margin of the Washakie Basin. The sparse vegetation, thin soil cover, and wind-eroded buttes are characteristic of the landscapes seen in arid Sweetwater County. Photograph courtesy of Edward R. McAuslan, Casper.



Topographic Map of Sweetwater County

Topography and Climate

Sweetwater, Wyoming's largest county, encompasses 10,420 square miles of stark arid prairie erratically shaped by hogbacks and mesas of stratified bedrock. Soil cover on the bedrock is sparse and consists of mixtures of blow-sand and silt, clay and rock fragments that occurs as outwash from the foothills, and stream alluvium.

The most conspicuous physiographic and structural feature in the county is the Rock Springs Uplift, a highly dissected, oval shaped asymmetrical dome, 60 miles long and 35 miles wide, that separates the downwarped Green River Basin on the west from the Great Divide and Washakie Basins on the east. Steamboat Mountain, on the north end of the Uplift, with an elevation of 8683 ft., is the county's highest point. The mountain is a mesa of poorly consolidated sedimentary rocks capped by hard, erosion resistant lava flows. The lowest point in the county lies in the channel of the Green River, within Flaming Gorge Reservoir at an elevation of 6040 ft.

East of the Uplift the terrain has an average elevation of about 7000 ft. The surface is hummocky and dissected by narrow draws and dry washes that are a measure of the bedrock's relative resistance to erosion by wind and water. Several small, intermittent streams have incised steep walled canyons as much as 500 feet deep into the east flank of the Uplift.

West of the Uplift, and more immediately within the erosive influence of the Green River and its tributaries, the terrain is relatively flat and has an average elevation of 6500 ft. Stark, pinnacle-like buttes rising more than 500 ft. above the plain show the extensive erosion that has taken place in the recent past. Orientation of the streams, within the relatively unconsolidated sediments, coincides closely with the regional joint and fracture pattern.

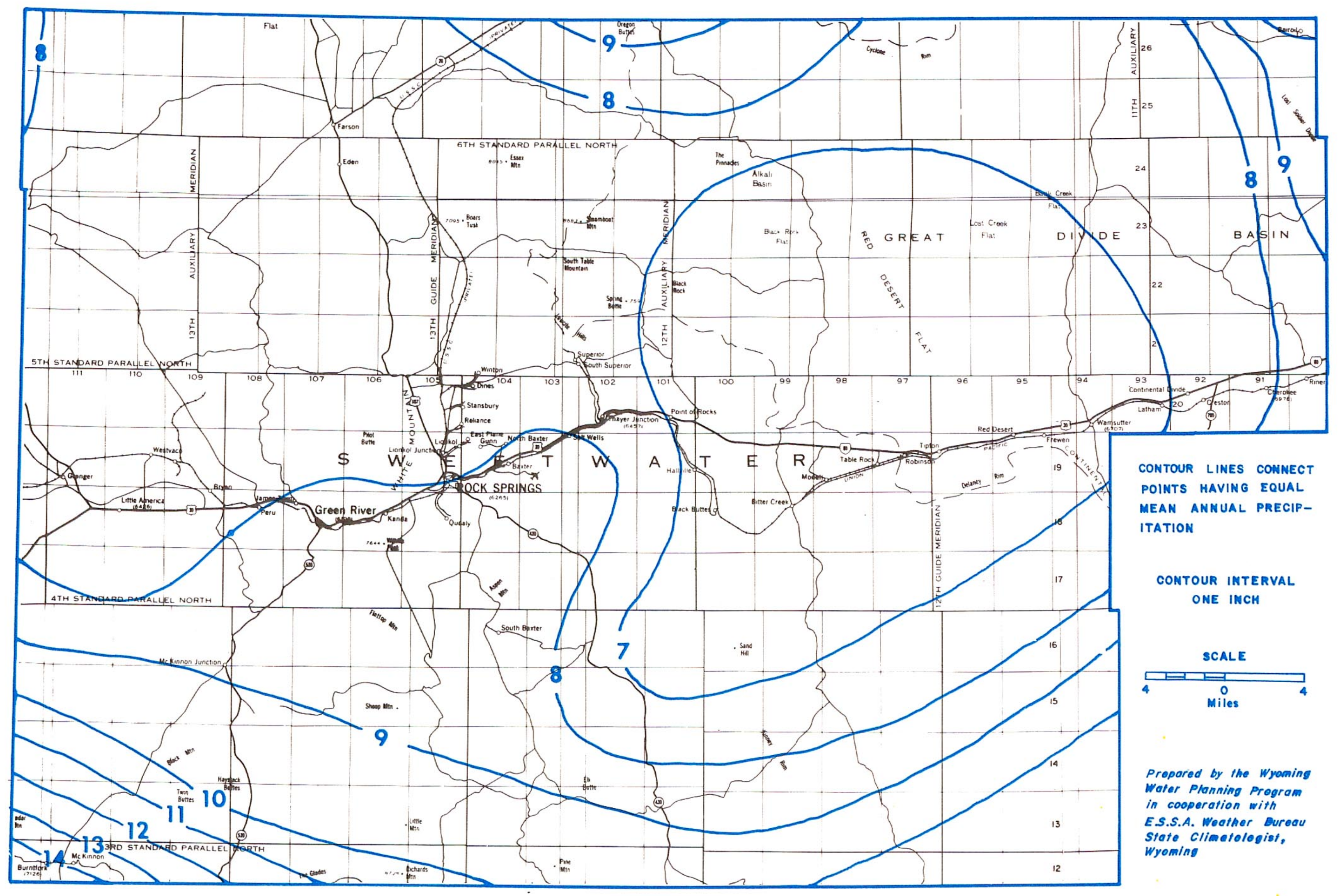
The Rock Springs Uplift itself is extensively dissected due to headward erosion by small intermittent creeks with steep gradients incised into the loose, unconsolidated Tertiary and Cretaceous strata. Many of the canyons exhibit preferential orientation N. 35° W. or N. 78° E. corresponding to one or more of the regional, joint and fracture systems in the bedrock. Bitter Creek, which flows southwesterly through the city of Rock Springs, is an almost perfect example of a joint-controlled superimposed stream across the Uplift.

The Great Divide Basin is unique and derives its name from the bifurcation of the Continental Divide around a 4000 square mile topographic depression. The terrain within the Basin is essentially flat, or hummocky, with numerous shallow dry washes. All surface drainage is intra-basinal and, alkaline throughout much of the year. Sand dunes, in varying stages of development and transport, are present along an east-west trend. The dunes extend eastward from the Killpecker Dunes south of Essex and Steamboat Mountains, to the Great Divide Basin, a distance of more than 50 miles.

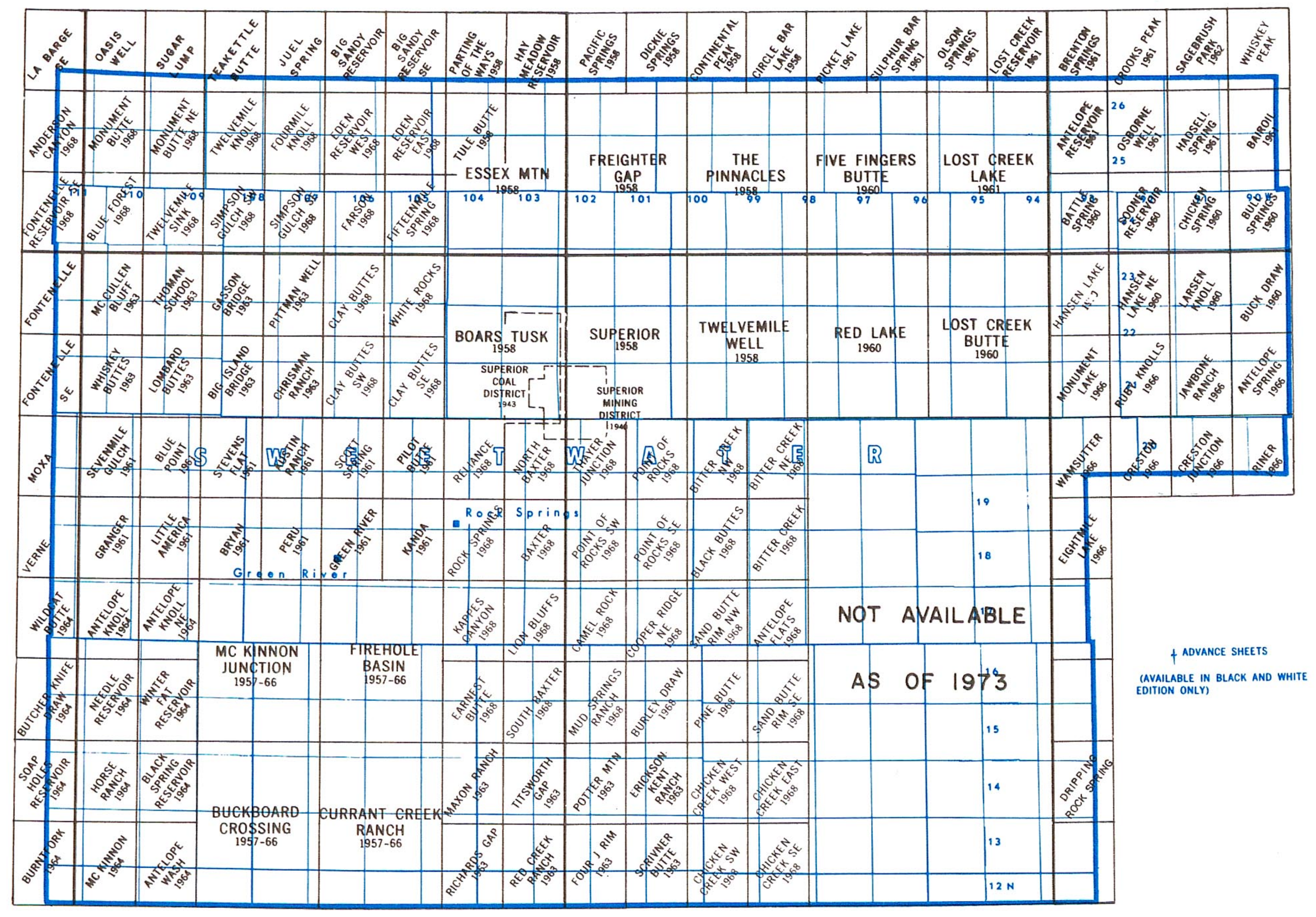
Early pioneers, settlers and fortune hunters traveling east and west avoided eastern Sweetwater County because of the terrain and the lack of fresh water. During the 1860's an Overland Trail Stage Line was created that established a route across the 130 mile expanse that is essentially paralleled today by the Union Pacific Railroad and Interstate 80. In January of 1973, Interstate 80 between Rawlins and Rock Springs had an average traffic rate of more than 3400 vehicles per day. West of Green River, traffic was the heaviest in the state with over 4200 vehicles per day.

Climate

The climate of Sweetwater County is best described as arid and windy with extreme ranges in temperature. The mean annual precipitation ranges from a minimum of less than seven inches per year in the Red Desert Basin to a maximum of fourteen inches per year in the Cedar Mountains, west of Flaming Gorge Reservoir. The prevailing fair weather surface winds are from the west and southwest. Temperature ranges are extreme with lows of -30°F to highs of over 100°F. The diurnal differences between daytime and nighttime temperatures average about 30°F in the summer and 20°F in the winter. Most of the county's precipitation occurs as rain from spring thundershowers. Although during the year 40-45 inches of snow and sleet fall upon the prairie, much of it sublimates back into the atmosphere and does not significantly benefit the county's water supply.



Mean Annual Precipitation

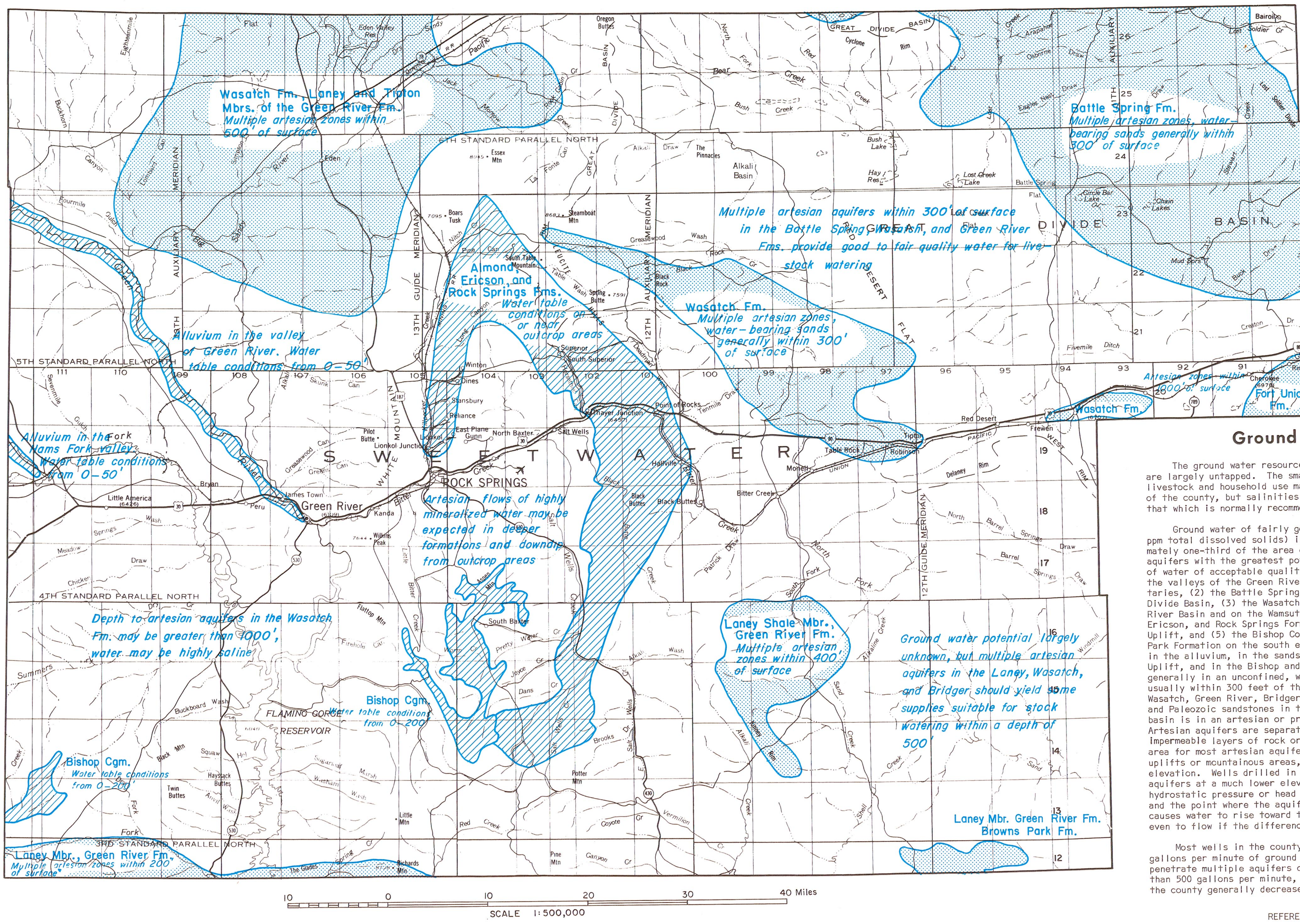


Index to Topographic Maps

Individual quadrangle sheets of Sweetwater County may be purchased from the following sources:

Mail order or over-the-counter sales: Distribution Section
U.S. Geological Survey
Federal Center, Bldg. 41
Denver, Colorado 80225

Over-the-counter sales only: Wyoming Geological Survey
Room 104, Geology Bldg.
University of Wyoming
Laramie, Wyoming 82070



Availability of Ground Water in Sweetwater County

MODIFIED FROM U.S. GEOLOGICAL SURVEY HYDROLOGICAL INVESTIGATIONS ATLAS NO.'S HA-219 AND HA-290

LEGEND

Areas in which groundwater having less than 1000 ppm dissolved solids should be generally available.

WATER TABLE CONDITIONS

PERMEABLE AQUIFER EXPOSED AT THE SURFACE, GROUNDWATER NOT PRESSURIZED.

ARTESIAN CONDITIONS

AQUIFER SEPARATED FROM THE SURFACE BY IMPERMEABLE LAYERS. WATER IS PRESSURIZED, WILL TEND TO RISE IN HOLE OR EVEN FLOW TO THE SURFACE WHEN AQUIFER IS TAPPED BY A WELL.

Ground Water

The ground water resources of Sweetwater County are largely untapped. The small amounts required for livestock and household use may be found in most parts of the county, but salinities are frequently higher than that which is normally recommended for human use.

Ground water of fairly good quality (less than 1000 ppm total dissolved solids) is available over approximately one-third of the area of Sweetwater County. The aquifers with the greatest potential for good quantities of water of acceptable quality are (1) alluvium along the valleys of the Green River and its major tributaries, (2) the Battle Spring Formation in the Great Divide Basin, (3) the Wasatch Formation in the Green River Basin and on the Wamsutter Arch, (4) the Almond, Ericson, and Rock Springs Formation on the Rock Springs Uplift, and (5) the Bishop Conglomerate and the Browns Park Formation on the south end of the uplift. Water in the alluvium, in the sandstones on the Rock Springs Uplift, and in the Bishop and Brown Park Formations is generally in an unconfined, water-table environment, usually within 300 feet of the surface. Water in the Wasatch, Green River, Bridger, and many of the Cretaceous and Paleozoic sandstones in the deeper parts of the basin is in an artesian or pressurized situation. Artesian aquifers are separated from the surface by impermeable layers of rock or sediment. The recharge area for most artesian aquifers is near the margins of uplifts or mountainous areas, at a generally high elevation. Wells drilled in the basins penetrate these aquifers at a much lower elevation. The difference in hydrostatic pressure or head between the recharge area and the point where the aquifer is tapped by a well causes water to rise toward the surface, and perhaps even to flow if the difference in head is great enough.

Most wells in the county yield between 10-100 gallons per minute of ground water. Deep wells which penetrate multiple aquifers could probably yield more than 500 gallons per minute, but water qualities in the county generally decrease with depth.

REFERENCES

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Welder, G. E., and McGreevy, L. J., 1966, Ground-water reconnaissance of the Great Divide and Washakie Basins and some adjacent areas, Southwestern Wyoming: U.S. Geol. Survey Hydrol. Inv. Atlas HA-219.

Surface Water

The major water source currently utilized for domestic, agricultural, and industrial purposes in Sweetwater County is the Green River and its tributaries. Since Wyoming is entitled by interstate compacts to more water than it is currently using from the Green River system, Sweetwater County can truly be said to have an abundance of surface water. However, most of the area of the county lies beyond the limits of easy accessibility to the waters of the Green. In such areas, agricultural and industrial activities may be serverely restricted by the absence of local usable ground water or by seasonal fluctuation in surface water supplies.

Sweetwater County includes parts of three major surface water drainage basins. Approximately 75% of the area of the county lies in the Green River-Colorado River drainage system, and almost all of the permanent streams in the county are found within this area. The Green River and its tributaries, Big Sandy River, Bitter Creek, Blacks Fork, and Henrys Fork, supply water for irrigation, municipal water systems, and industry in the western one-third of the county. Flaming Gorge Reservoir, with its recreational and scenic attractions is an additional water-related asset to the county's economy.

The northeastern quarter of Sweetwater County is an area of closed drainage. This area is called the Great Divide Basin because it actually is situated astride the Continental Divide, which bifurcates into two segments, one bounding the eastern and one the western side of the basin. All of the sparse precipitation which falls on the area of the Great Divide Basin remains within the basin. None of the streams within the basin flow throughout the year.

A tiny part of the Sweetwater-Platte River drainage system extends into the northern part of Sweetwater County.

REFERENCES

Hendricks, E. L., 1964, Compilation of records of surface waters of the United States, October 1950 to September 1960, Part 9. Colorado River Basin: U.S. Geol. Survey Water-Supply Paper 1733, p. 208-231.

U.S. Geol. Survey, 1970, Surface water supply of the United States 1961-65, Part 9. Colorado River Basin, p. 53-129.

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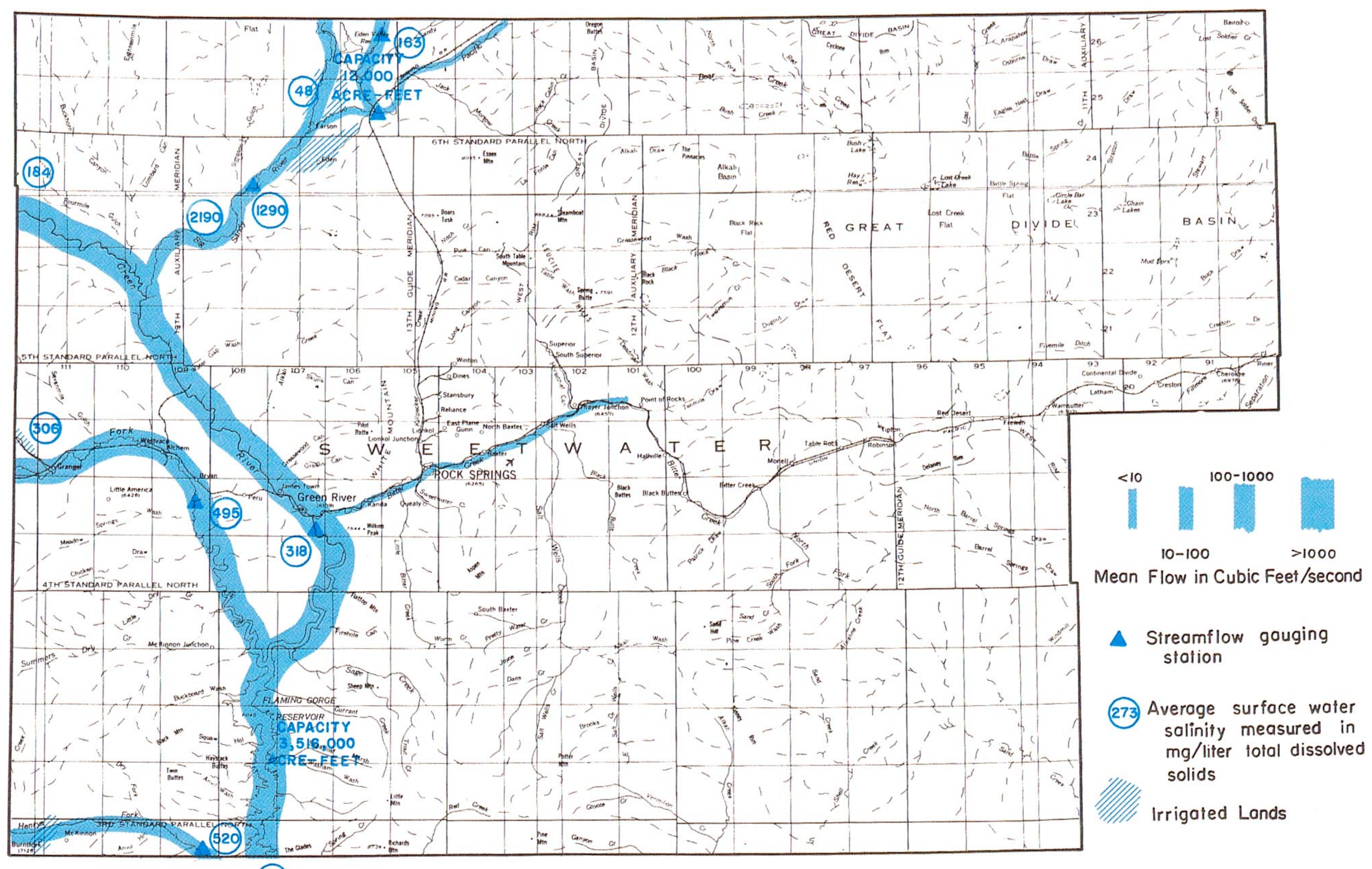
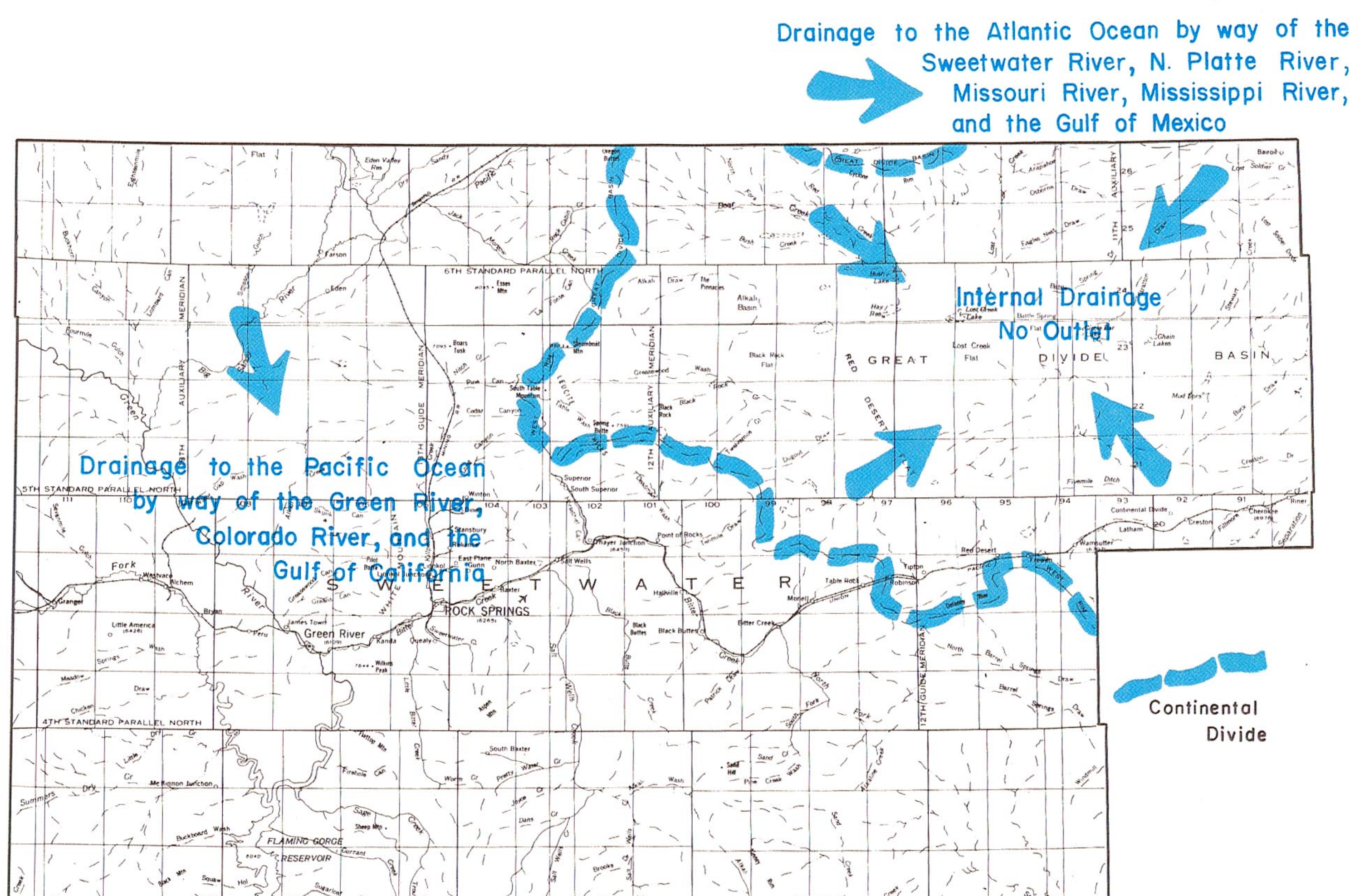


Major Streams, Their Mean Flows and Salinities



Major Drainage Basins

Tollgate Rock and The Palisades, Eocene age rock formations along the Green River northwest of Green River townsite. The Green River is the major surface water resource of Sweetwater County. Photo courtesy Union Pacific Railroad.

CR2-2

ERRATA

On the COAL PLATE, the coal bed names Paehlgia #1 and #2 shown for the Jim Bridger coal mine should be Deadman #1 and #2.